COCOMOII & COCOTS Application

User Manual

Maysinee Nakmanee

Contents

Introduction

Constructive Cost Estimation Model (COCOMO) had been introduced by Dr. Barry Boehm [Software Engineering Economics, 1981] as an objective cost model for planing and executing software project. Walker Royce had given COCOMO a definition as a well-defined, open "engineering" basis for reasoning about the cost and schedule implications of a software solution, and was a minor breakthrough in the software industry. COCOMO rapidly became the most popular software cost model. Then, it became the COCOMOII, which incorporates several field-tested improvement to both broaden its applicability and improve its estimating and accuracy for modern software development approaches

Currently, a new generation of software processes and products is changing the way organizations develop software. Commercial off-the-shelf (COTS) approach has also become one of the new evolutionary, risk driven, and collaborative software processes. Then, it became the integration of constructive commercial off-the-shelf (COCOTS) approach to COCOMOII approach.

The current version of COCOMOII application supports only COCOMOII calculation, which is the estimation of cost, effort, and schedule of the new project. When the COCOTS theory has been introduced, it has brought the new idea of using the pre-existing software that is self-contained off-the-shelf components. It will take advantage of existing, market proven, vendor-supported products, and also reduce overall system development costs.

Hence, COCOMOII and COCOTS application had been developed to estimate cost, schedule, and effort to support both new project components (COCOMOII), and COTS components. It combines all cost, schedule, and effort, required to complete the project based on both models. This application is a part of directed research I worked with Chris Abts and Dr. Barry Boehm, Center of Software Engineering, University of Southern California (USC), 2000.

However, this application can also support either COCOMOII or COCOTS calculations separately. The result of COCOMOII estimation when planning a new software development activity will be the same as USC's COCOMOII application. The result of COCOTS calibration will provide the best way to construct a new system basing on the three determinants of feasibility--technical, economic, and strategic constraints.

According to the current state of COCOTS Model study, the first version of COCOMOII and COCOTS application has been introduced to both collect data for research and also to estimate cost and schedule for software projects. Hence, it was developed using spreadsheet. All the features and functions in this application will be suitable for all types of users, novice, intermittent, and experts. It will be the first application help users in exploring the idea of applying COCOMOII and COCOTS theory in their projects.

Model Overview

[Software Cost Estimation with COCOMOII, 2000] COCOMOII is an objective cost model for planning and executing software projects. It is an important ingredient for managing software projects or software lines of business. A cost model provides a framework for communicating business decisions among the stakeholders of a software effort. COCOMOII supports contract negotiations, process improvement analyses, tool purchases, architecture changes, component make/buy tradeoffs, and several other return-on-investment decisions with a credible basis of estimate a model to help you reason about the cost and schedule implications of software decisions you may need to make.

Unlike the initial COCOMO 81 situation in the late 1970s, in which there was a single, preferred software life-cycle model (the waterfall model), current and future software projects will be tailoring their particular process drivers. These process drivers include COTS or reusable software availability, degree of understanding of architectures and requirements; market window or other schedule constraints; and required reliability for an example of such tailoring guidelines.

Chris Abts said in the same book that COCOTS is an amalgam of four related sub models, each addressing individually what we have identified as the four primary sources of COTS software integration costs. (This is another key point. COCOTS at the stage of development being describe here in deals only with initial integration efforts. The long-term operation and maintenance effort is to be models in the future release of COCOTS

Initial integration costs are attributed to the effort needed to perform (1) candidate COTS component assessment, (2) COTS component tailoring, (3) the development and testing of any integration or “glue” code needed to plug COTS components into a larger system, and (4) increased system level programming due to volatility in incorporated COTS components.

Assessment is the process by which COTS components are selected for use in the larger system being developed. Tailoring refers to those activities that would have to be performed to prepare a particular COTS program for use, regardless of the system into which it is being incorporated, or even if operating as a standalone item. These are things such an initializing parameter values, specifying I/O screens or report formats, setting up security protocols, etc. Glue code development and testing refers to the new code external to the COTS components itself that must be written in order to plug the component into the larger system. This code by nature is unique to the particular context in which the COTS components is being used, and must mot be confused with tailoring activity as defined above. Volatility in the context refers to the frequency with which new versions or updates of the COTS software being used in a larger system are released by the vendors over the course of the system’s development and subsequent deployment.

It should also be noted, however, that while the Assessment sub model lends itself easily to use very early in the project planning stages, the tailoring, glue code, and volatility sub models by the very nature of the costs they are trying to address and more problematic if used before the specific COTS products that will actually be integrated into a new system have

been identified. The reason is that the costs covered by these models are extremely dependent on the unique characteristics of any given set of COTS products and their vendors.

Application Overview

COCOMOII and COCOTS application composes of these following set;

P0. Start Page

Contain all links to all sub models in COCOMOII and COCOTS application.

P1. Overall Project:

Contain all information about project characteristics, which will be used to calibrate all information in both COCOMOII and COCOTS models.

It composes of these following pages.

- ***P1.1*** *Project Level Information*
- ***P1.2*** *COCOMOII Project Scale Factor*
- ***P1.3*** *COCOTS Project Scale Factor*
- ***P1.4*** *Schedule Compression*

P2. COCOMOII

Contain all COCOMOII factors' sheets, which required user to input information for calibrating output COCOMOII value. It calculates project cost and schedule for COCOMOII data as same as USC's COCOMOII model does.

It composed of these following pages.

- ***P2.1*** *COCOMOII Input*
- ***P2.2*** *COCOMOII Output*

P3. COCOTS Sheet

Contain all COCOTS classes' sheets, which required user to input information for calibrating all COCOTS components.

It composed of these following pages.

- ***P3.1*** *COCOTS Assessment*
- ***P3.2*** *COCOTS Tailoring* [Adapted from Jason K.Wong Version1.00]
- ***P3.3*** *COCOTS Glue Code Information* [Adapted from Jason K.Wong Version1.00]
- ***P3.4*** *COCOTS Glue Code*
- ***P3.5*** *COCOTS System Volatility*

P4. Combined Schedule sheet

Contain all information about project schedule, which will estimate project's schedule from COCOMOII & COCOTS

P5. Master parameter

Contain parameter value, which will be used in all sheets.

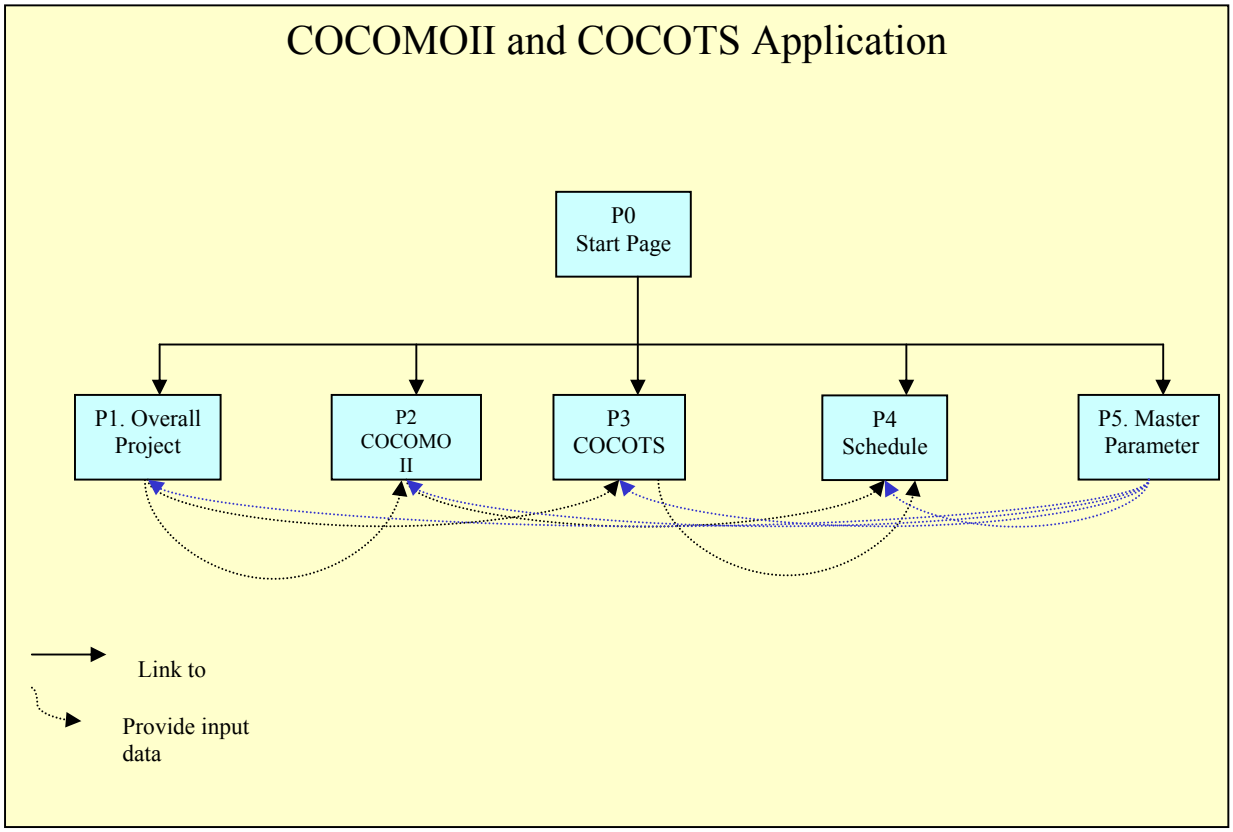


Figure 1. Application Overview

Who is our user?

The COCOMOII and COCOTS is built for project's estimation so that our user are persons, team, company or other relevant stakeholders that would like to estimate their project by using our application. According to the diversity of user, COCOMOII & COCOTS application is built in the user-friendly style to support all types of users.
Understanding the user

According to the diversity of users, the following knowledge may be required for using this application. This application has to support from novice users to expert users. Some may be people from technology side and some may come from business side. However, when both sides come to work on this application, they should have the common knowledge that can help them use this application effectively.

1.1 Basic Project Knowledge

The application requires users to know about project's characteristics. They have to be able to calibrate level of each project characteristics. They should be able to estimate the overall project's line of code, time and required working-persons.

They should be able to estimate project's schedule
In case of using COCOMOII Model, they should understand all this following project factors: project factors, platform factors, personal factors.

In case of using COCOTS model, they have to be able to classify project's Class. They should be able to assess all characteristics of each COTS's class. After that, they have to be able to tailor all those classes which will lead to work on glue code and system volatility.

In summary, the users should understand all projects' characteristic before they start using this application.

1.2 Basic Technical Knowledge

The software is a stand–alone software system intended for a single user. It has been developed on Microsoft Excel spreadsheet version. Hence, it is user-friendly application attempting to interface well with user needs. Both Novice and Expert users can work with this application as well.

Begin using the application

System Requirements

Before using the application, you required to meet these following requirements.

Hardware requirements

- PC- recommend Pentium I 100 MHz up
- 4.3 GB Hard Disk (or the available disk space should be around 1 GB)
- 32 MB RAM

Software requirements

- Windows 95, 98, NT
- Microsoft Excel (**Enabled Macro** *Required*)

Initialize the application

The Application required user to enable Macro operation.
To open Application file:

- Open Microsoft Excel
- Choose File from Location
- Click Enable Macro

Understand the Technical Standard

Standard	Description
Windows-Based application	All interface in windows-based style
User friendly	Using Visual Basic features for activate/hide all sheets to be easily for user
Radio Button group	For one selection from choices
Check Box	For more than one selection from choices
Standard Color	Use only major colors: white, blue, grey, black, yellow
White Blank	Input that user has to fill in
Grey Fill	Information link from other page
Yellow Fill and red font	Output from calculation
Purple fill	Overridable Field
Font	Arial
Comment	Put in comment box. It will show up the red dot at the corner of box. When user makes a mouse over, It will pop-up comment.
Field	Only blank field that allow users to fill in

P0. Start Page

Description
This page is the main page linked to other sheets. It will be open first.

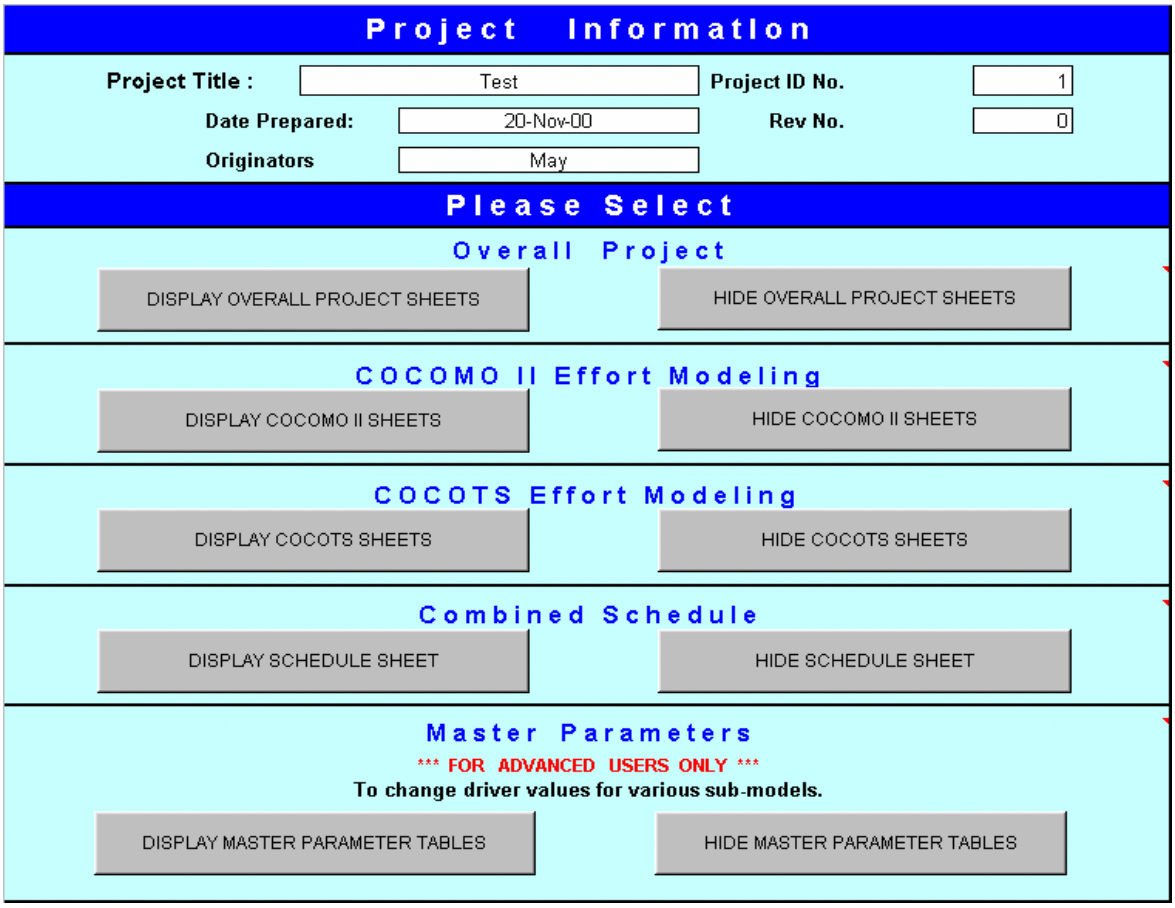
Features
Section 1: ***Project header***
Section 2: ***Menu Selection***

- Display/Hide Overall Project sheets
- Display/Hide COCOMO II sheets
- Display/Hide COCOTS sheets
- Display/Hide Schedule sheets
- Display/Hide Master Parameter sheet

Instructions
Fill in the project information section. Then, project information will appear in other sheets. This page can link to the other sheets by click on the select button. After finished using other sheets, you can click hide button to hide that sheet.

Step	Step description	System response/ Notes
I	Click Display Button	The application will pop up the selected sheet
II	Click Hide Button	The application will hide up the selected sheet

Application Interface


Project Information
Project Title :
Test
Project ID No.
1
Date Prepared:
20-Nov-00
Rev No.
0
Originators
May
Please Select
Overall Project
DISPLAY OVERALL PROJECT SHEETS
HIDE OVERALL PROJECT SHEETS
COCOMO II Effort Modeling
DISPLAY COCOMO II SHEETS
HIDE COCOMO II SHEETS
COCOTS Effort Modeling
DISPLAY COCOTS SHEETS
HIDE COCOTS SHEETS
Combined Schedule
DISPLAY SCHEDULE SHEET
HIDE SCHEDULE SHEET
Master Parameters
*** FOR ADVANCED USERS ONLY ***
To change driver values for various sub-models.
DISPLAY MASTER PARAMETER TABLES
HIDE MASTER PARAMETER TABLES

P.1 Overall Project

Description

This Group composes of 4 main pages. All pages will appear after clicking on display overall project in P.0

P1.1 Project Level Info Sheet
P1.2 COCOMOII Project Scale Factor Sheet
P1.3 COCOTS Project Scale Factor Sheet
P1.4 Schedule Compression Sheet

P.1.1 Project Level Information

Description

This page is for input project level information. User must input all project characteristics in blank fields.

Features

Section 1: ***Project header***

- Display Project Information header

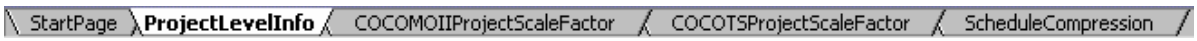
Section 2: ***Project Level Information Input form***

- Display Input fields/selections for project level information

Instructions

Step	Step description	System response/ Notes
I	Input in blank field	Keep information in database

Application Interface



Project Level Information

Project Title : Test **Project ID No.** 1

Date Prepared: 20-Nov-00 **Rev No.** 0

Originators May

Project Domain

Core System Functionality
- ○ Operational, Mission Critical
- ○ Operational, Non-Mission Critical
- ○ Support

Commnunications, Navigation and Surveillance
- ○ Operational, Mission Critical
- ○ Operational, Non-Mission Critical
- ○ Support

Administrative
- ○ Operational, Mission Critical
- ○ Operational, Non-Mission Critical
- ◉ Support

Other (describe)
- ○

Where dors COTS assessment occur in life cycle?

Delivery Scheduling (circle one)
- ○ Delivery to one location, no on-going maintenance
- ◉ Delivery to one location, maintenance on-going
- ○ Delivery to multiple location, no on-going maintenance
- ○ Delivery to multiple location, maintenance on-going

Schedule Duration (calendar months)

Project Total Effort (person-months)

Standard Person-month (hrs/person-month)

Project Total Delivered Source Code SLOC

SLOC Count Type

◉ Logical ○ Physical (semicolons) ○ Physical (carriage return) ○ Non-commented/Non-blank ○ Others

Programming Languages

Language	% of Total SLOC

Total System Function Point

System Architecture

○	Pipe & Filter	◉ Distributed	○ Main/Subroutine
○	Multithreads	○ Backboad/Single Layer or general repositary	○ Closed Loop Feedback Control
○	Rule-based	○ Transaction Database Centric	○ Layers
○	Event Based	○ Real Time	○ Others

System Architecting Process (Describe)

P1.2 COCOMOII Project Scale Factors Sheet

Description

This page is for Project Scale Factors.

Features

Section 1: Project Header

- Display Project Information header

Section 2 – 6: Input Sections for COCOMOII

Section 2: Precedentedness (PREC)

T1.2.1. PREC Table with 4 sub tables

- Display Input PREC sub tables
- Display Output PREC table calibrated from PREC sub tables

Section 3: Development Flexibility (FLEX)

T1.2.2. FLEX Table with 3 sub tables

- Display Input FLEX sub tables
- Display Output FLEX table calibrated from FLEX sub tables

Section 4: Architecture/Risk Resolution (RESL)

T1.2.3. RESL Table with 7 sub tables

- Display Input RESL sub tables
- Display Output RESL table calibrated from RESL sub tables

Section 5: Team Cohesion (TEAM)

T1.2.4. TEAM Table with 4 sub tables

- Display Input TEAM sub tables
- Display Output TEAM table calibrated from TEAM sub tables

Section 6: Process Maturity (PMAT)

T1.2.5. Return out put in Scale Factor value

- Display Input PMAT sub tables
- Display Output PMAT table calibrated from PMAT sub tables

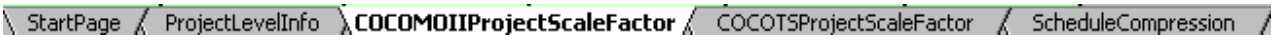
Instructions

Select your project characteristics in the sub-tables in each section; it will appear result for main table. You can change value or re-select value in main input section.

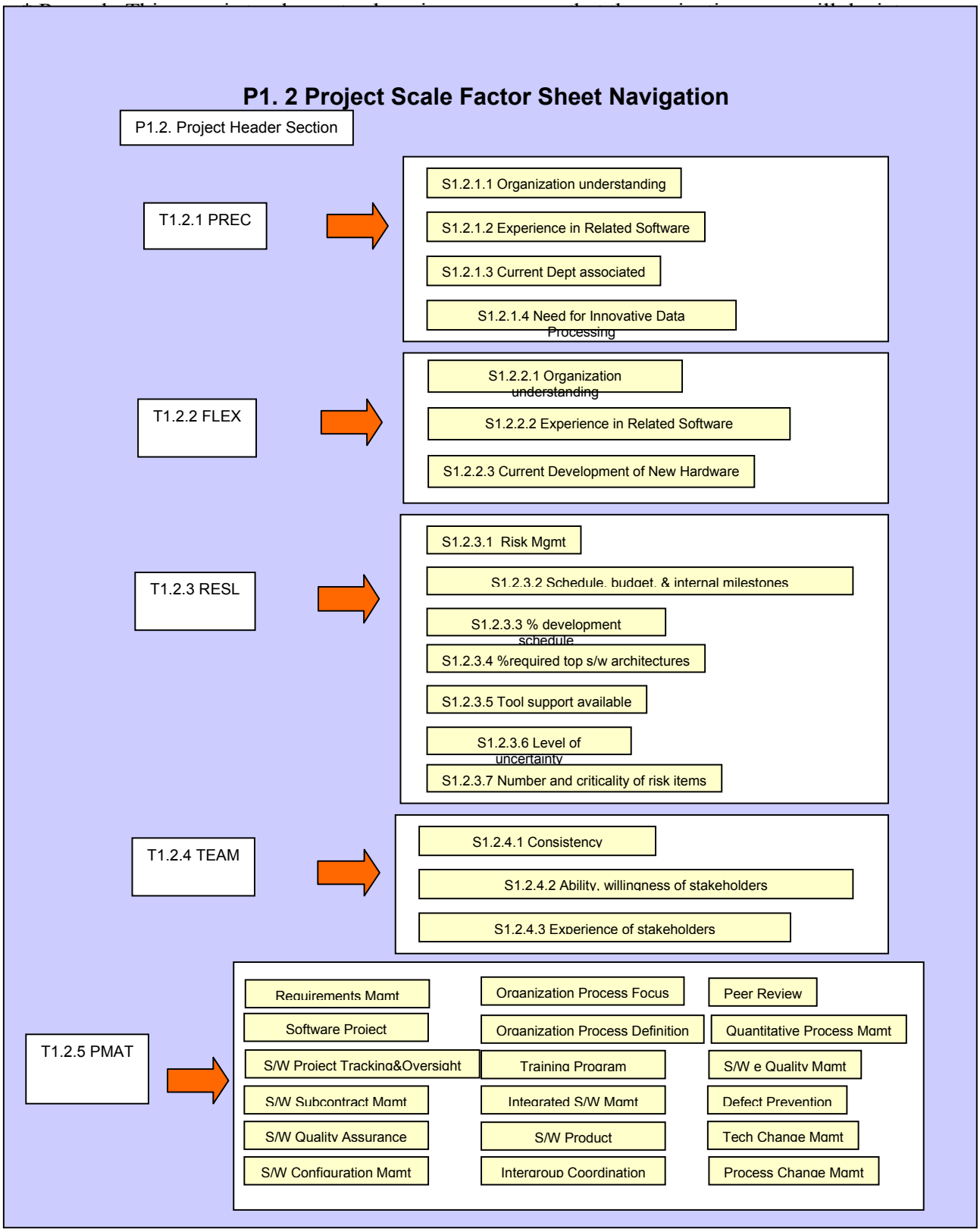
To select all field, put "X" in the desired blank-fled.

Step	Step description	System response/ Notes
I	Input PREC sub tables	Calibrate PREC value to PREC table
II	Input FLEX sub tables	Calibrate FLEX value to FLEX table
III	Input RESL sub tables	Calibrate RESL value to RESL table
IV	Input TEAM sub tables	Calibrate TEAM value to TEAM table
V	Input PMAT sub tables	Calibrate PMAT value to PMAT table

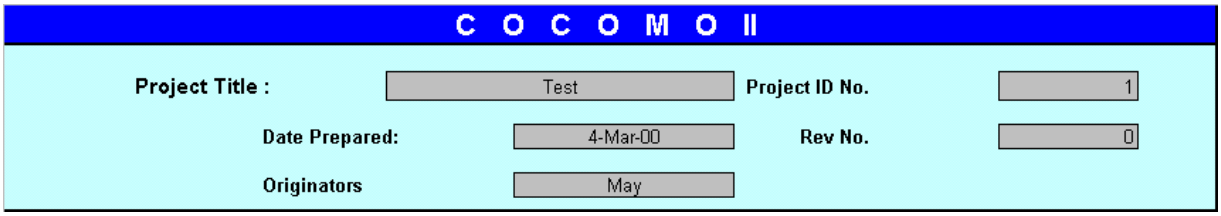
Application Interface P1.2



P1.2 Page Navigation



Section 1: Project Header



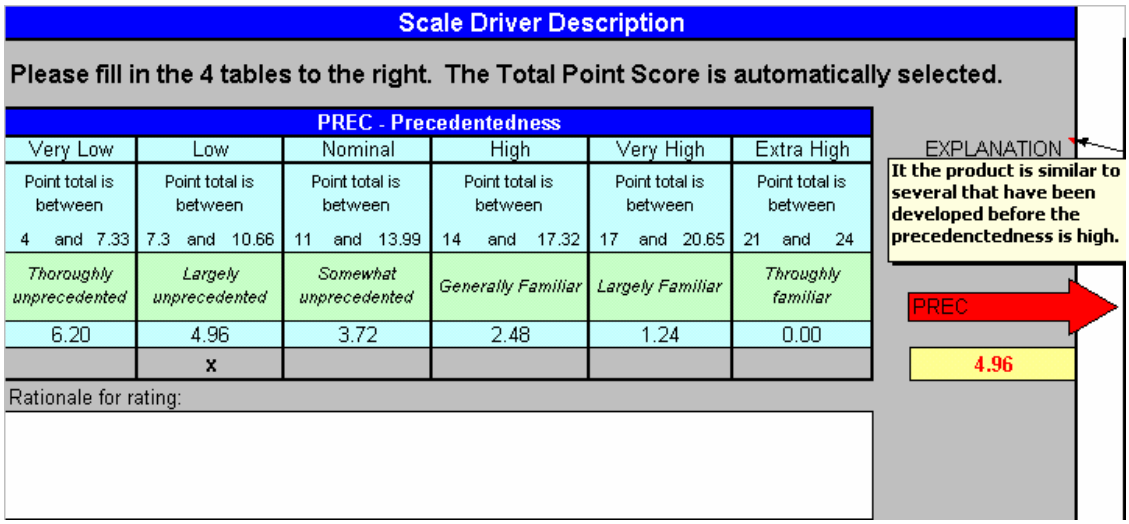
Section 2: Precedentedness (PREC)

Show PREC value in T1.2.1 PREC Table after input all sub tables

Instructions

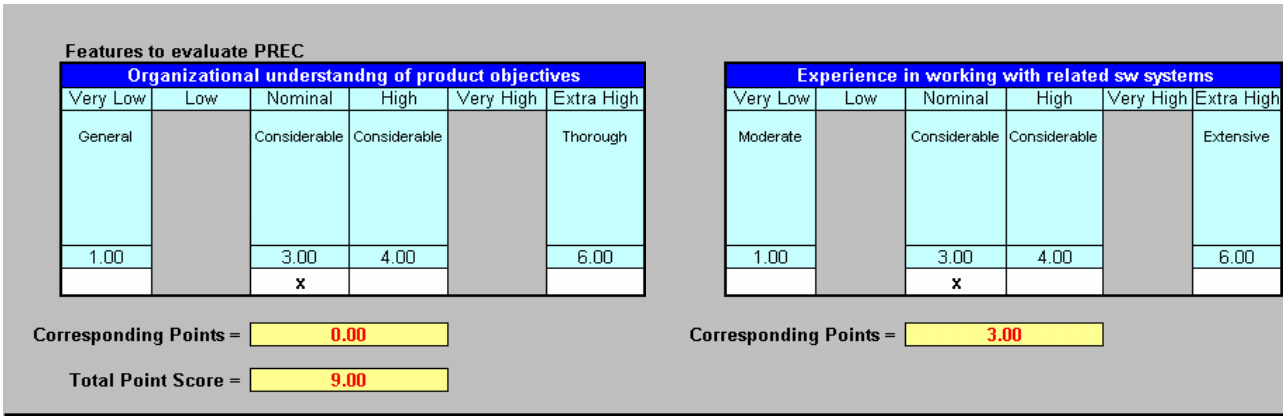
Step	Step description	System response/ Notes
I	User Go To T.1.2.1 PREC Table	
II	Scroll Right to sub table	
III	Enter "X" in selected rank for S.1.2.1.1	Show value of selected field in correspondent point
IV	Enter "X" in selected rank for S.1.2.1.2	Show value of selected field in correspondent point
V	Enter "X" in selected rank for S.1.2.1.3	Show value of selected field in correspondent point
VI	Enter "X" in selected rank for S.1.2.1.4	Show value of selected field in correspondent point
VII	Scroll Back to Table S.1.2.1.1	Show "Total Point" of all selected fields
VIII	Scroll Back to Table T.1.2.1	Show the selected Value "x" correspondent to total Point Score
IX		Show value of automatic selected field in Output Box
X	[Option] Change "x" in Table T.1.2.1	Show value of selected field in correspondent point

T1.2.1. PREC Table



S1.2.1.1 Table

S1.2.1.2 Table



Features to evaluate PREC

Organizational understandng of product objectives					
Very Low	Low	Nominal	High	Very High	Extra High
General		Considerable	Considerable		Thorough
1.00		3.00	4.00		6.00
		x			

Corresponding Points = 0.00

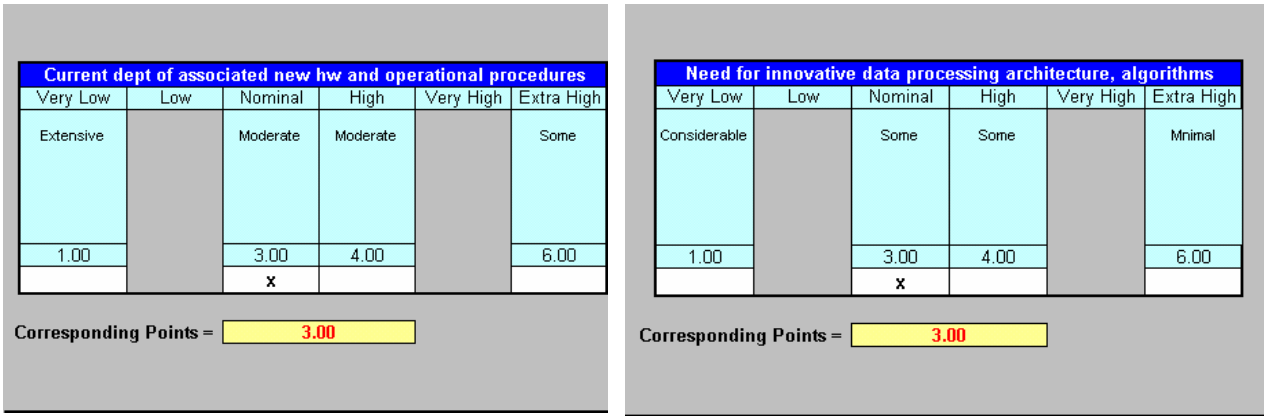
Total Point Score = 9.00

Experience in working with related sw systems					
Very Low	Low	Nominal	High	Very High	Extra High
Moderate		Considerable	Considerable		Extensive
1.00		3.00	4.00		6.00
		x			

Corresponding Points = 3.00

S1.2.1.3 Table

S1.2.1.4 Table



Current dept of associated new hw and operational procedures					
Very Low	Low	Nominal	High	Very High	Extra High
Extensive		Moderate	Moderate		Some
1.00		3.00	4.00		6.00
		x			

Corresponding Points = 3.00

Need for innovative data processing architecture, algorithms					
Very Low	Low	Nominal	High	Very High	Extra High
Considerable		Some	Some		Mnimal
1.00		3.00	4.00		6.00
		x			

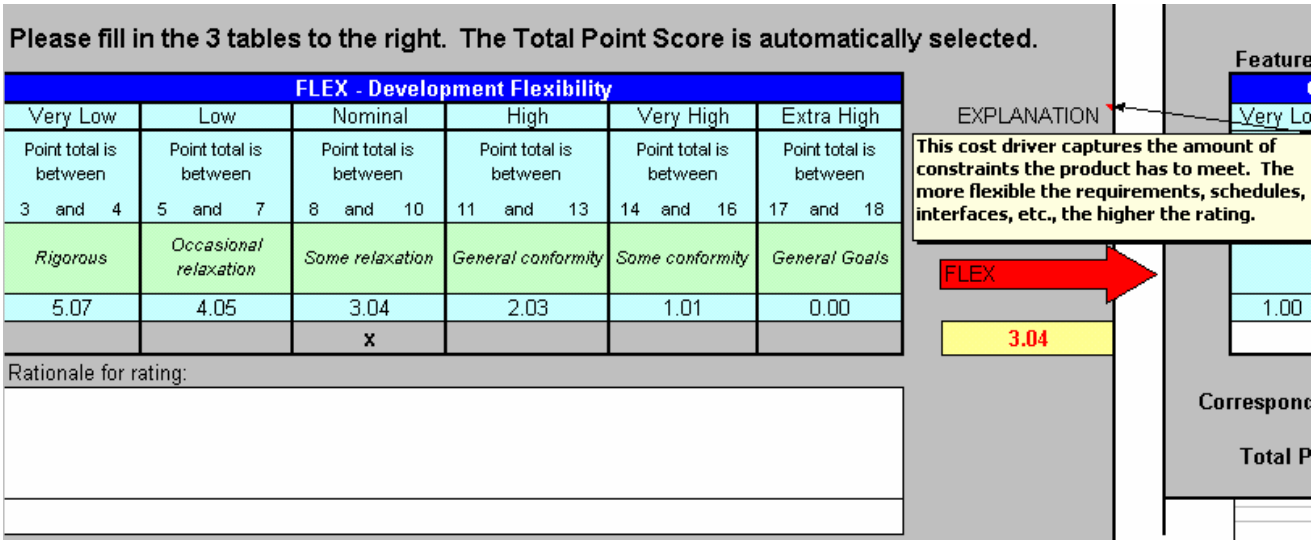
Corresponding Points = 3.00

Section 3: ***Development Flexibility (FLEX)***

Show FLEX value in S T 1.2.2 FLEX Table after input all sub tables

Step	Step description	System response/ Notes
I	User Go To T.1.2.2 FLEX Table	
II	Scroll Right to sub table	
III	Enter "X" in selected rank for S.1.2.2.1	Show value of selected field in correspondent point
IV	Enter "X" in selected rank for S.1.2.2.2	Show value of selected field in correspondent point
V	Enter "X" in selected rank for S.1.2.2.3	Show value of selected field in correspondent point
VI	Scroll Back to Table S.1.2.2.1	Show "Total Point" of all selected fields
VII	Scroll Back to Table T.1.2.2	Show the selected Value "x" correspondent to Total Point Score
VIII		Show value of automatic selected field in Output Box
IX	[Option] Change "x" in Table T.1.2.2	Show value of selected field in correspondent point

T1.2.2 FLEX Table



S1.2.2.1 Table

Features to evaluate FLEX

Organizational understandng of product objectives					
Very Low	Low	Nominal	High	Very High	Extra High
Full		Considerable	Considerable		Asaic
1.00		3.00	4.00		6.00
		x			

Corresponding Points = 3.00

Total Point Score = 9.00

S1.2.2.2 Table

Experience in working with related sw systems					
Very Low	Low	Nominal	High	Very High	Extra High
Full		Considerable	Considerable		Asaic
1.00		3.00	4.00		6.00
		x			

Corresponding Points = 3.00

S1.2.2.3 Table

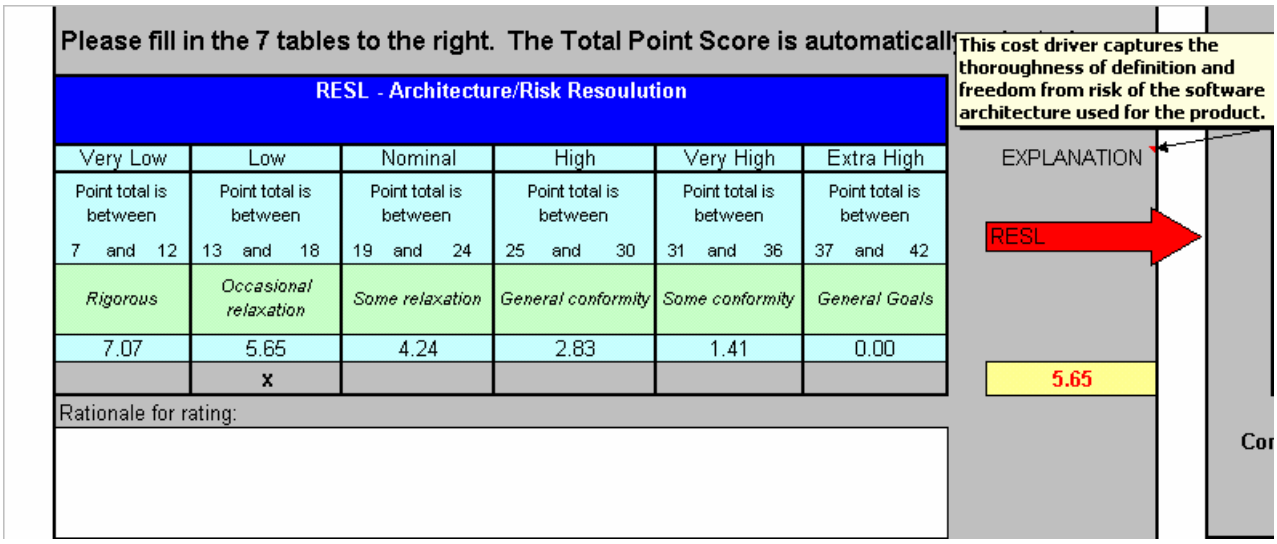
Current dev of associated new hw and operational procedures					
Very Low	Low	Nominal	High	Very High	Extra High
High		Moderate	Moderate		Low
1.00		3.00	4.00		6.00
		x			

Corresponding Points = 3.00

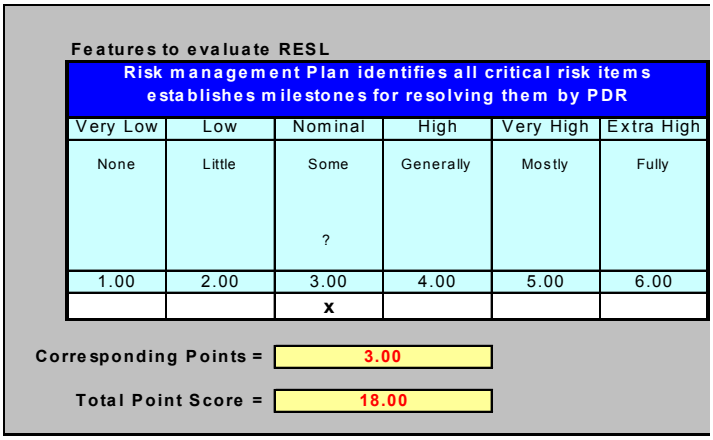
Section 4: ***Architecture/Risk Resolution (RESL)***
Show RESL value in T1.2.3 RESL Table after input all sub tables

Step	Step description	System response/ Notes
I	User Go To S1.2.3 RESL Table	
II	Scroll Right to sub table	
III	Enter "X" in selected rank for S.1.2.3.1	Show value of selected field in correspondent point
IV	Enter "X" in selected rank for S.1.2.3.2	Show value of selected field in correspondent point
V	Enter "X" in selected rank for S.1.2.3.3	Show value of selected field in correspondent point
VI	Enter "X" in selected rank for S.1.2.3.4	Show value of selected field in correspondent point
VII	Enter "X" in selected rank for S.1.2.3.5	Show value of selected field in correspondent point
VIII	Enter "X" in selected rank for S.1.2.3.6	Show value of selected field in correspondent point
IX	Enter "X" in selected rank for S.1.2.3.7	Show value of selected field in correspondent point
X	Scroll Back to Table S.1.2.3.1	Show "Total Point" of all selected fields
XI	Scroll Back to Table T.1.2.3	Show the selected Value "x" correspondent to Total Point Score
XII		Show value of automatic selected field in Output Box
XIII	[Option] Change "x" in Table T.1.2.3	Show value of selected field in correspondent point

T1.2.3 RESL Table



S1.2.3.1 Table



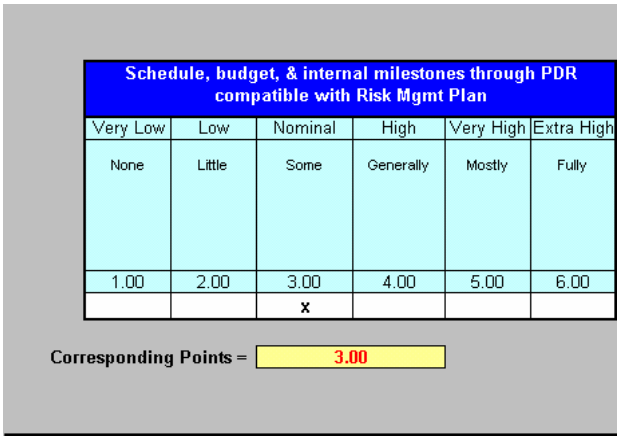
Features to evaluate RESL

Risk management Plan identifies all critical risk items establishes milestones for resolving them by PDR					
Very Low	Low	Nominal	High	Very High	Extra High
None	Little	Some ?	Generally	Mostly	Fully
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

Total Point Score = 18.00

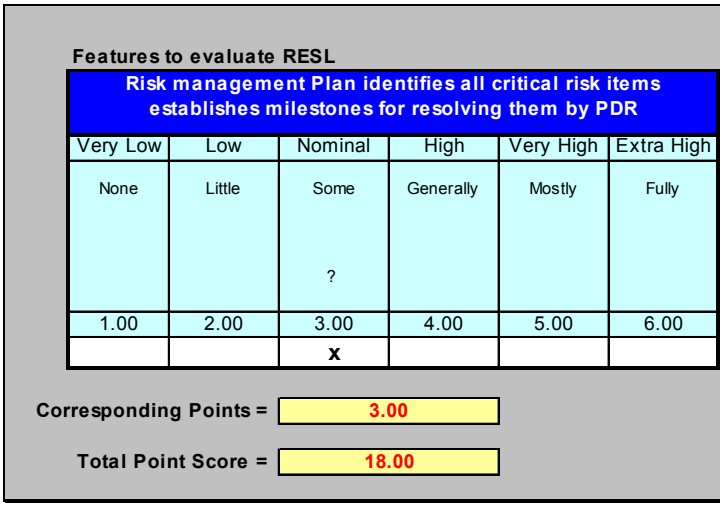
S1.2.3.2 Table



Schedule, budget, & internal milestones through PDR compatible with Risk Mgmt Plan					
Very Low	Low	Nominal	High	Very High	Extra High
None	Little	Some	Generally	Mostly	Fully
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

S1.2.3.3.Table



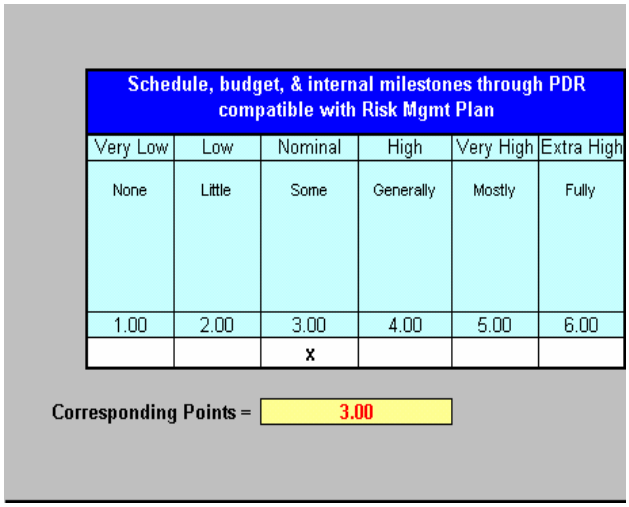
Features to evaluate RESL

Risk management Plan identifies all critical risk items establishes milestones for resolving them by PDR					
Very Low	Low	Nominal	High	Very High	Extra High
None	Little	Some ?	Generally	Mostly	Fully
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

Total Point Score = 18.00

S1.2.3.4 Table



Schedule, budget, & internal milestones through PDR compatible with Risk Mgmt Plan					
Very Low	Low	Nominal	High	Very High	Extra High
None	Little	Some	Generally	Mostly	Fully
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

S1.2.3.5 Table

Tool support available for resolving risk items, developing and veryfying architechtural specs					
Very Low	Low	Nominal	High	Very High	Extra High
20%	40%	60%	80%	100%	120%
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

S1.2.3.6 Table

Level of uncertainty in Key architechture drivers: mission, user interface, COTS, hw, technology, performance					
Very Low	Low	Nominal	High	Very High	Extra High
Extreame	Significant	Considerable	Some	Little	Very little
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

S1.2.3.7 Table

Number and criticality of risk items					
Very Low	Low	Nominal	High	Very High	Extra High
> 10 Critical	5-10 Critical	2-4 Critical	1 Critical	>5 Non-Critical	<5 Non-Critical
1.00	2.00	3.00	4.00	5.00	6.00
		x			

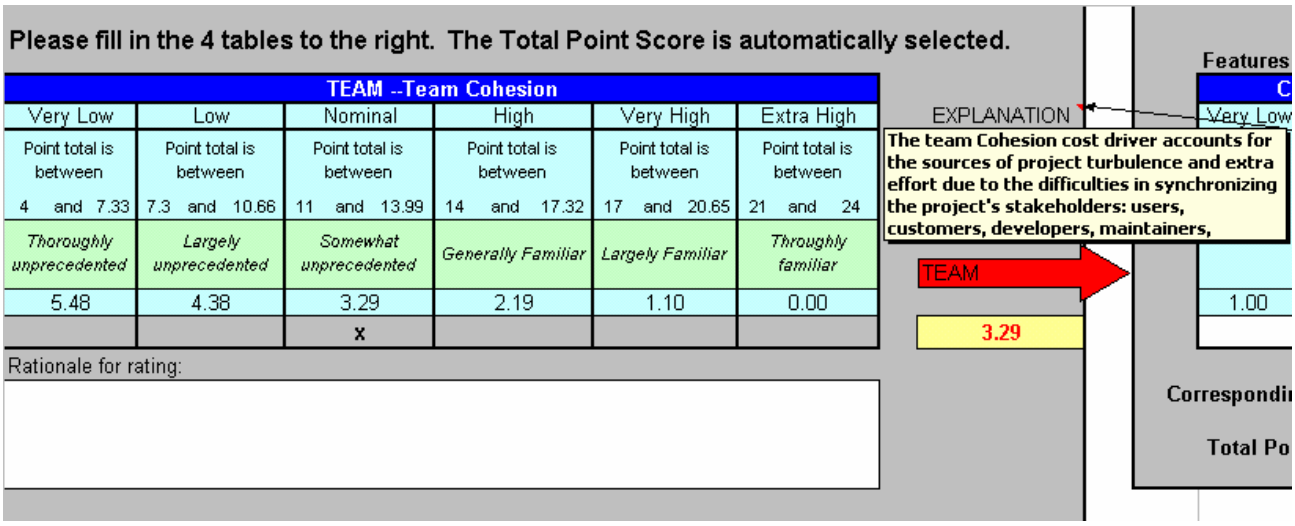
Corresponding Points = 3.00

Section 5: Team Cohesion (TEAM)

Show TEAM value in T1.2.4 TEAM Table after input all sub-tables

Step	Step description	System response/ Notes
I	User Go To T1.2.4 TEAM Table	
II	Scroll Right to sub table	
III	Enter "X" in selected rank for S1.2.4.1	Show value of selected field in correspondent point
IV	Enter "X" in selected rank for S1.2.4.2	Show value of selected field in correspondent point
V	Enter "X" in selected rank for S1.2.4.3	Show value of selected field in correspondent point
VI	Scroll Back to Table S1.2.4.1	Show "Total Point" of all selected fields
VII	Scroll Back to Table T1.2.4	Show the selected Value "x" correspondent to Total Point Score
VIII		Show value of automatic selected field in Output Box
IX	[Option] Change "x" in Table T1.2.4	Show value of selected field in correspondent point

T1.2.4. TEAM Table



S1.2.4.1 Table

Features to evaluate TEAM

Consistency of stakeholder objectives and cultues					
Very Low	Low	Nominal	High	Very High	Extra High
Little	Some	Basic	Considerably	Strong	Fully
1.00	2.00	3.00	4.00	5.00	6.00
			x		

Corresponding Points = 4.00

Total Point Score = 13.00

S1.2.4.2 Table

Ability, willingness of stakeholders to accommodate other					
Very Low	Low	Nominal	High	Very High	Extra High
Little	Some	Basic	Considerably	Strong	Fully
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

S1.2.4.3 Table

Experience of stakeholders in operating as a team					
Very Low	Low	Nominal	High	Very High	Extra High
None	Little	Little	Basic	Considerable	Extensive
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

S1.2.4.4 Table

Stakeholder teambuilding to achieve shared vision and					
Very Low	Low	Nominal	High	Very High	Extra High
None	Little	Little	Basic	Considerable	Extensive
1.00	2.00	3.00	4.00	5.00	6.00
		x			

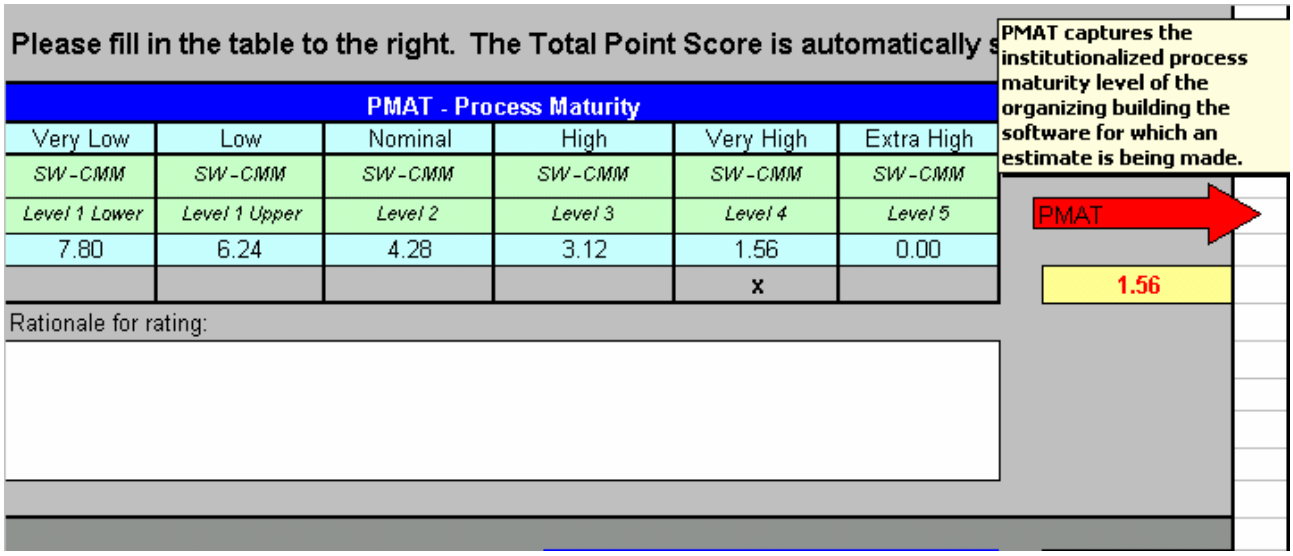
Corresponding Points = 3.00

Section 6: ***Process Maturity (PMAT)***

PMAT value in T1.2.5 PMAT Table after input all sub tables

Step	Step description	System response/ Notes
I	User Go To T1.2.5 PMAT Table	
II	Scroll Right to sub table	
III	Enter "X" in selected rank for S1.2.5.1	Show value of selected field in correspondent point
IV	Scroll Back to Table S1.2.5.1	Show "Total Point" of all selected fields
V	Scroll Back to Table T1.2.5	Show the selected Value "x" correspondent to Total Point Score
VI		Show value of automatic selected field in Output Box
VII	[Option] Change "x" in Table T1.2.5	Show value of selected field in correspondent point

T1.2.5 Table



S1.2.5.1 Table

PMAT Evaluation								
Key Process Area	Almost	Very Often	About Half	Some	Rarely If	Doesn't	Don't	
	1	0.75	0.5	0.25	0	1	0	
Requirements Management	x							1
Software Project Planning	x							1
Software Project Tracking and C	x							1
Software Subcontract Managem	x							1
Software Quality Assurance	x							1
Software Configuration Manage	x							1
Organization Process Focus	x							1
Organization Process Definition	x							1
Training Program	x							1
Integrated Software Manageme	x							1
Software Product Engineering	x							1
Intergroup Coordination	x							1
Peer Review	x							1
Quantitative Process Managem	x							1
Software Quality Management	x							1
Defect Prevention	x							1
Technology Change Manageme	x							1
Process Change Management	x							1

Output of Scale Factor

ΣSF (Summation of Scale Factor) =	18.50

P1.3 COCOTS Project Scale Factors Sheet

Description
This sheet is the scale factor for COCOTS value

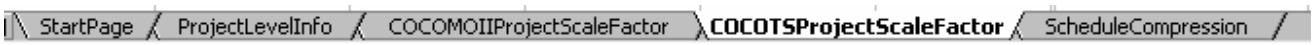
Features
Section 1: ***Project Header***
- Display Project Information header

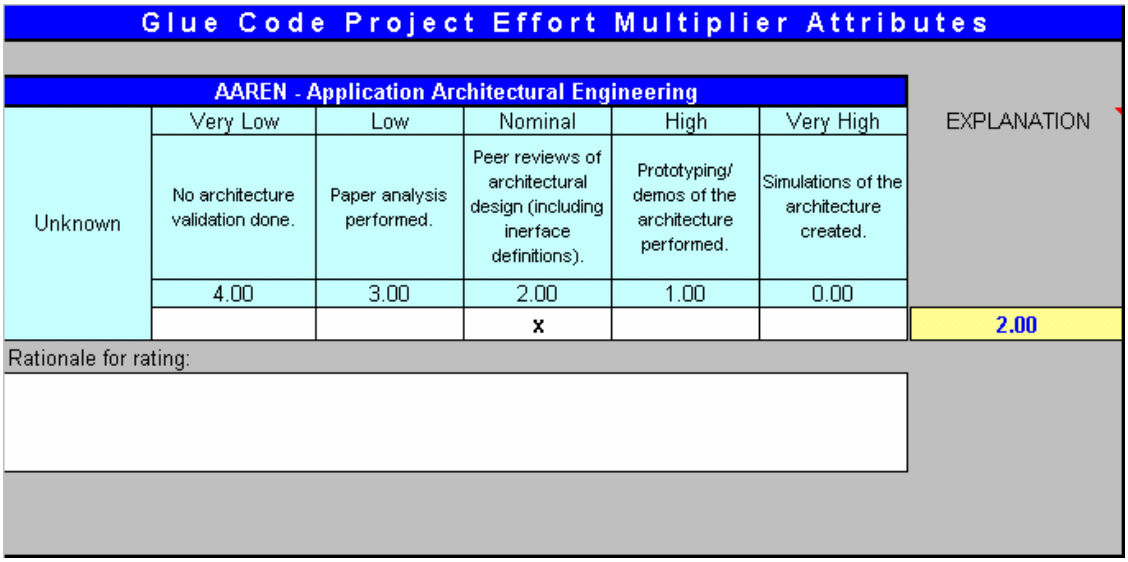
Section 2: ***Glue Code Project Effort Multiplier Attributes***
- Display Input selection
- Return selected value

Instructions
To select all field, put "X" in the desired blank-fled.

Step	Step description	System response/ Notes
I	Input in blank field	Keep information in database

Application Interface





P1.4 Schedule Compression

Description

This sheet is the input value for schedule compression used for all project

Features

Section 1: ***Project Header***

- Display Project Information header

Section 2: ***Schedule Compression***

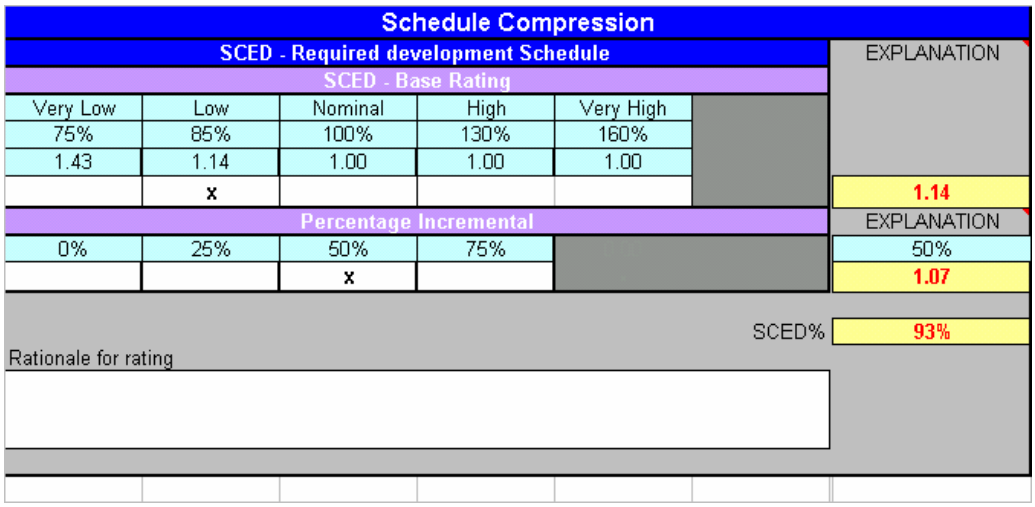
- Display Input selection
- Return selected value

Instructions

To select all field, put "X" in the desired blank-fled.

Step	Step description	System response/ Notes
I	Input in blank field	Keep information in database

Application Interface



P2 COCOMOII Main Page

Description

This sheet is the main page for COCOMOII Modules. It consists of 3 main sections

Features

Section 1: ***Project header***

Section 2: ***Modules used for COCOMOII***

- Selection for up to10 COCOMOII module for your project
- Display/Hide input form/Output form

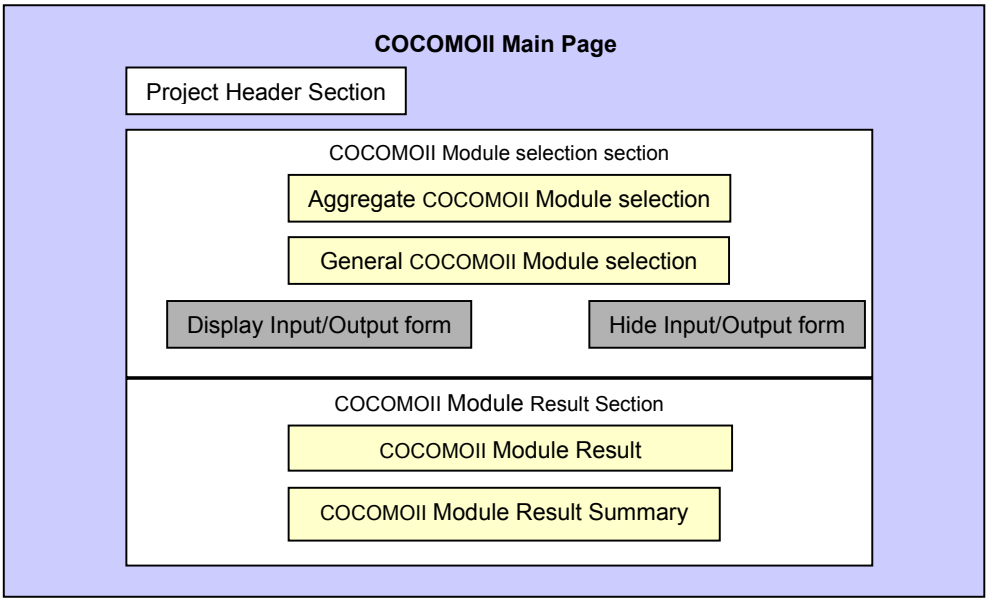
Section 3: ***Result of COCOMOII***

- Link all result of COCOMOII of each Module
- Return all information after input all input form

Instruction

You have to select classes of COCOMOII Module used in your project, and then after you select display input form; it wills pop-up input/output form for each class. You can also add more classes in the blank field. The application will pop up new module as you input

Page Navigation

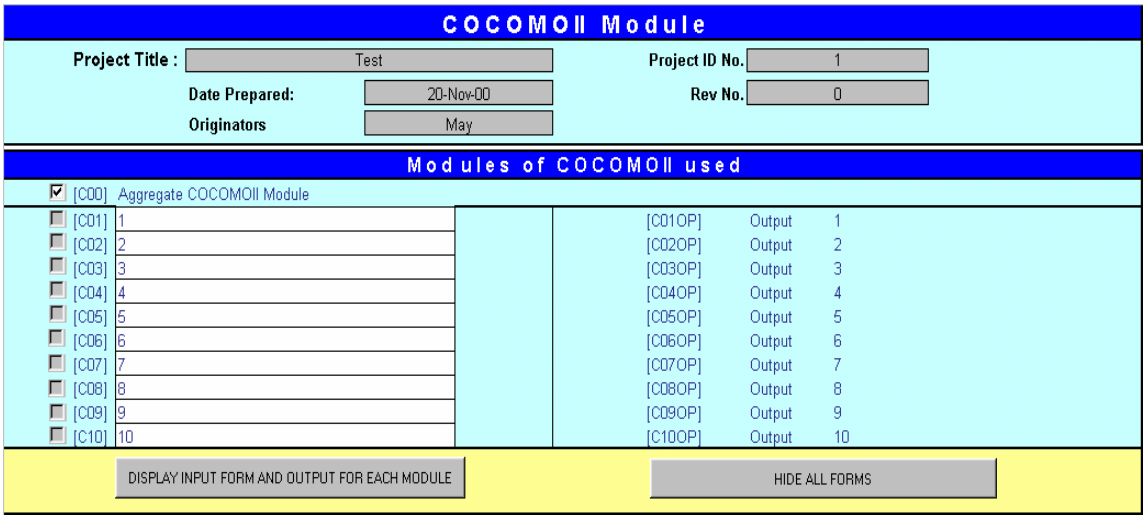


Application Interface

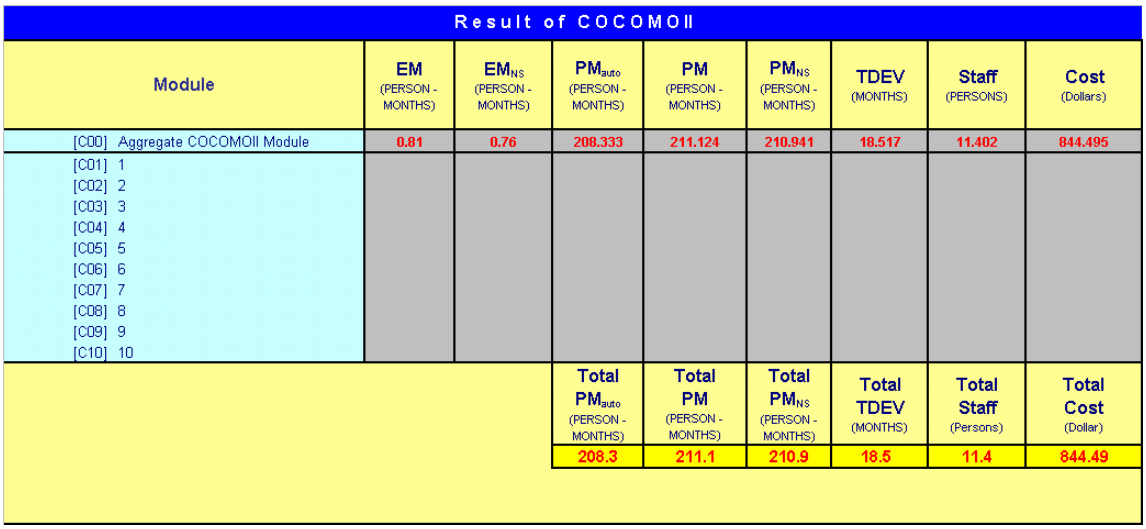
Section1: ***Project Header***

Section2: *COCOMOII Module selection section*

Step	Step description	System response/ Notes
I	<Option1> Click [C00] in case required only 1 aggregate COCOMOII Module	Disabled all detailed class
II	<Option 2> Click Modules that exist in your project, Input Module Name in blank field.	Disabled Aggregate class
III	Select "Display" Button	Display input form/Output form for each selected class
IV	<Option> Select "Hide" Button	Hide all input form/Output forms \



Section3: *COCOMOII Module Result section*



P2.1 COCOMOII Input form

Description
COCOMOII will estimate value for each module in your project after input all factors

Features
Composed with 5 main input sections

Section 1: ***Project Header***

Section 2: ***Sect.2.1.1 Product factor***

- **T2.1.1.1. Requirement Software Reliability--RELY**
- **T2.1.1.2 Data Size--DATA**
- **T2.1.1.3 Complexity--CPLX**
  - S2.1.3.1 Control Operation
  - S2.1.3.2 Computation Operation
  - S2.1.3.3 Device Independent
  - S2.1.3.4 Data Management
  - S2.1.3.5 User Interface Mgmt
- **T2.1.1.4 Required Usability--RUSE**
- **T2.1.1.5 Documentation Match to life Cycle—DOCU**

Section 3: ***Sect.2.1.2 Personal factor***

- **T2.1.2.1. Personal Factor--PCON**
- **T2.1.2.2 Analyst Capability--ACAP**
- **T2.1.2.3 Programmer Capability--PCAP**
- **T2.1.2.4 Application Experience--AEXP**
- **T2.1.2.5 Platform Experience--PEXP**
- **T2.1.2.6 Language and Tool Experience—LEXP**

Section 4: *Sect.**2.1.3 Platform factor***

- **T2.1.3.1. Execution Time Constraint--TIME**
- **T2.1.3.2. Main Storage Constraint--STOR**
- **T2.1.3.3. Platform Volatility—PVOL**

Section 5: ***Sect.2.1.4 Project factor***

- **T2.1.4.1. Use of the Software Tool--TOOL**
- **T2.1.4.2. Multisite Development--SITE**

Instructions

You have to input product factor, platform factor, project factor, and personal factor sheets. Then, application will calibrate COCOMOII output in main page.

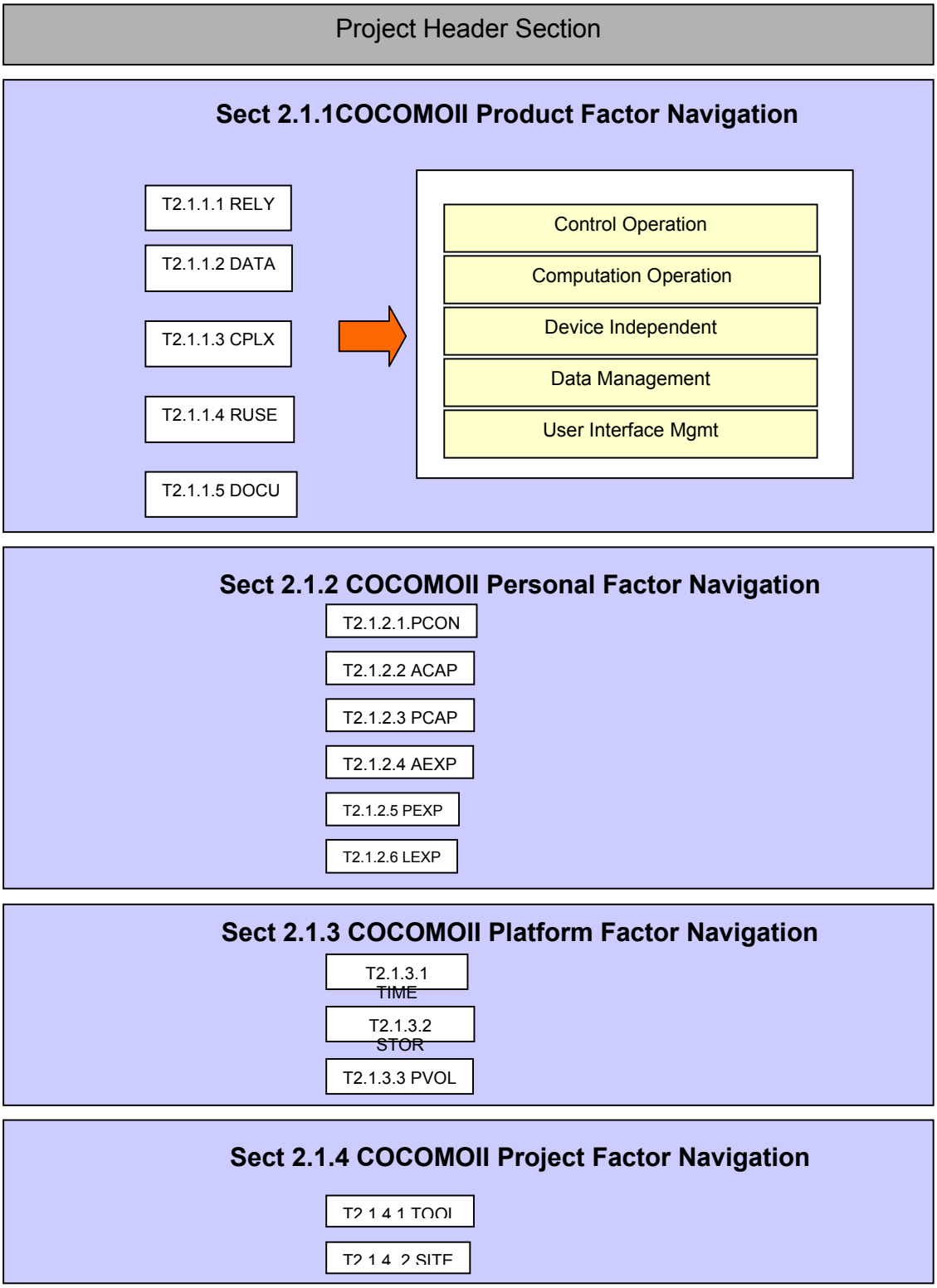
There are sub-tables for each section. Select your project characteristics in the sub-tables; it will appear result for main table. You can change value or re-select value in main input section.

To select all field, put “X” in the desired blank-fled

Application Interface

P2.1 Page Navigation

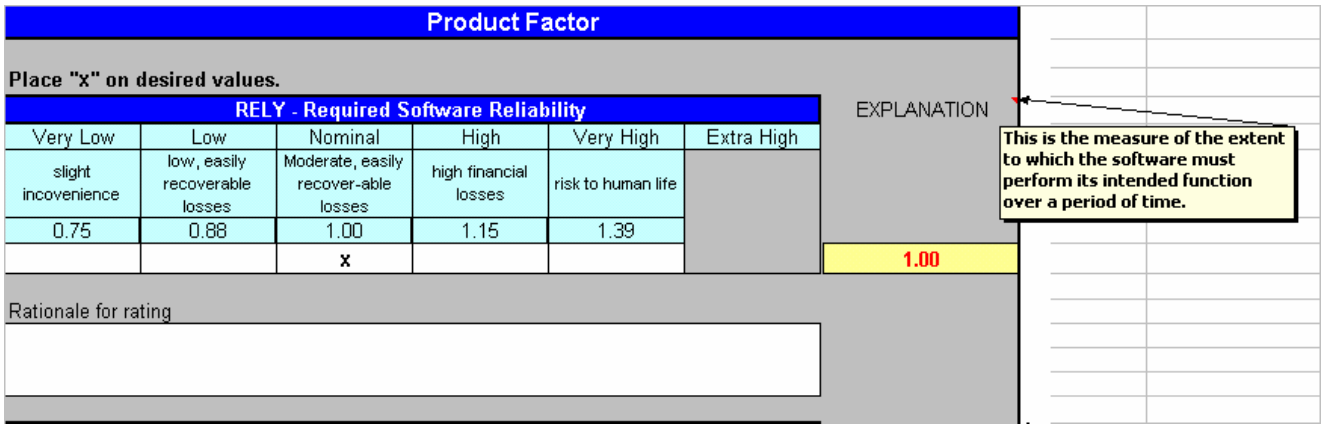
* Remark This page is too large to show in one page, so that the navigation page will depict the overall sheet .



Section 2: Product Scale Factors Section

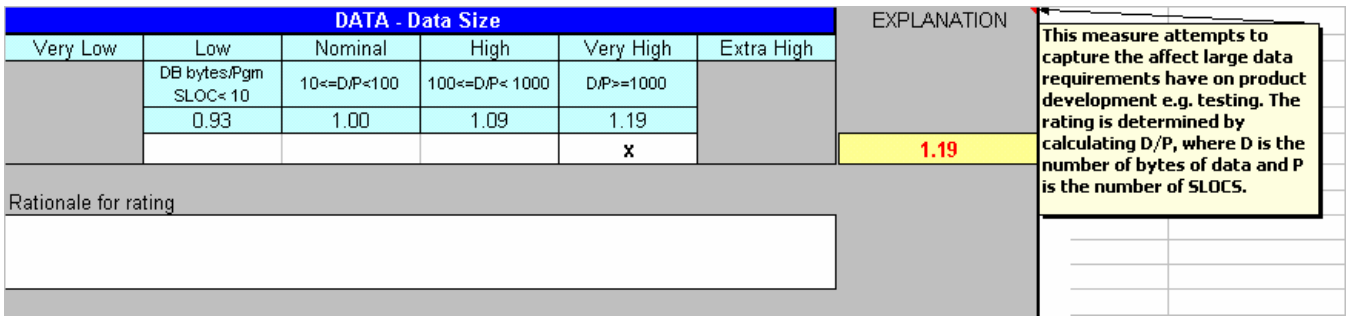
T2.1.1.1. Requirement Software Reliability--RELY

Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of automatic selected field in Output Box



T2.1.1.2 Data Size--DATA

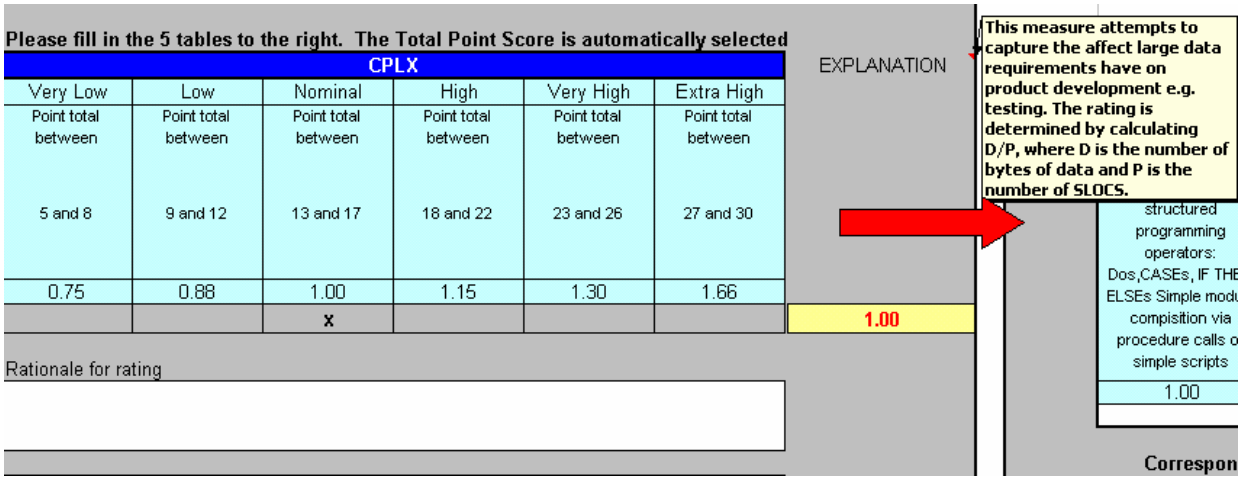
Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box



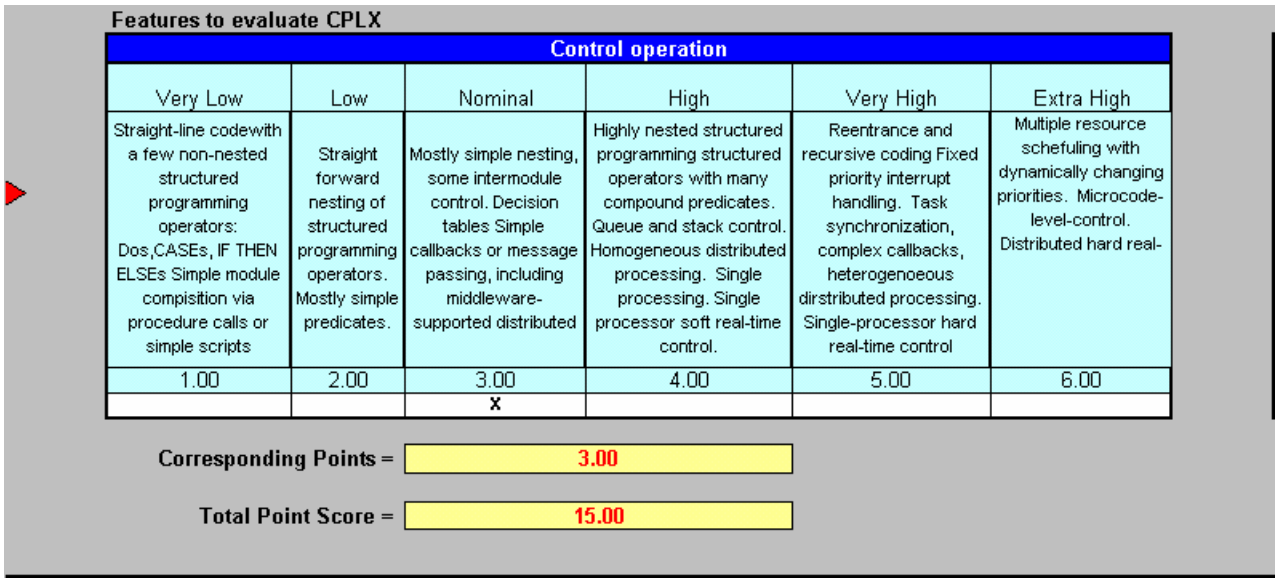
T.2.1.1.3 CPLX Process

Step	Step description	System response/ Notes
1	User Go To S.2.1.1.3 CPLX table	
2	Scroll Right to sub table	
3	Enter "X" in selected rank for S.2.1.1.3.1	Show value of selected field in correspondent point
4	Enter "X" in selected rank for S.2.1.1.3.2	Show value of selected field in correspondent point
5	Enter "X" in selected rank for S.2.1.1.3.3	Show value of selected field in correspondent point
6	Enter "X" in selected rank for S.2.1.1.3.4	Show value of selected field in correspondent point
7	Enter "X" in selected rank for S.2.1.1.3.5	Show value of selected field in correspondent point
8	Scroll Back to Table S.2.1.1.3	Show "Total Point" of all selected fields
9	Scroll Back to Table S.2.1.1.3	Show the selected Value "x" correspondent to Total Point Score
10		Show value of selected field in Output Box
11	[Option] Change "x" in Table S.2.1.1.3	Show value of selected field in correspondent point

T.2.1.1.3 CPLX Table



S.2.1.1.3.1 Sub-Table of CPLX



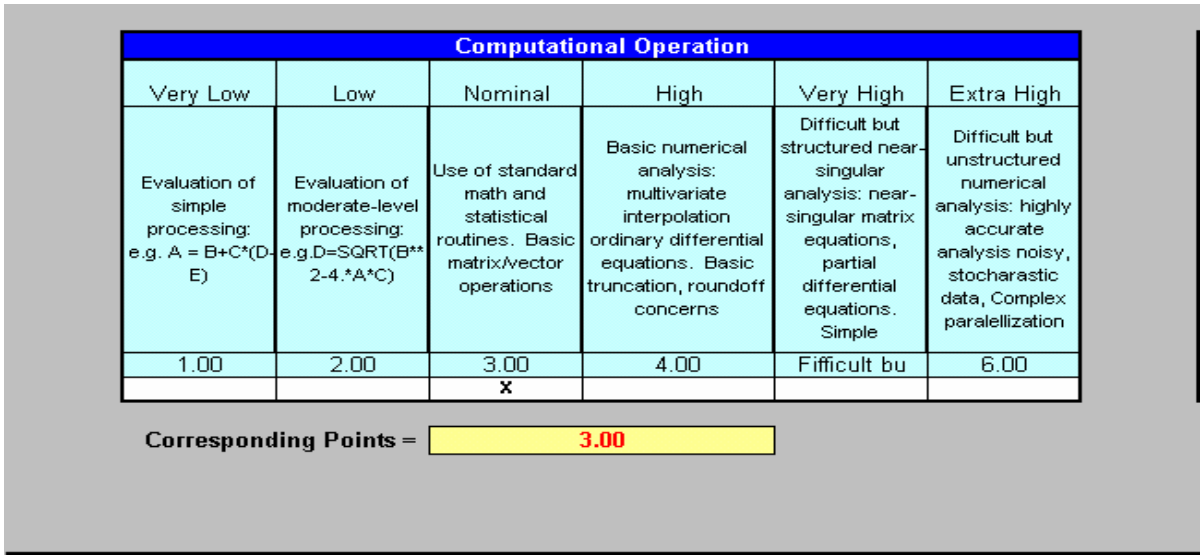
Features to evaluate CPLX

Control operation					
Very Low	Low	Nominal	High	Very High	Extra High
Straight-line codewith a few non-nested structured programming operators: Dos,CASEs, IF THEN ELSEs Simple module compisition via procedure calls or simple scripts	Straight forward nesting of structured programming operators. Mostly simple predicates.	Mostly simple nesting, some intermodule control. Decision tables Simple callbacks or message passing, including middleware-supported distributed	Highly nested structured programming structured operators with many compound predicates. Queue and stack control. Homogeneous distributed processing. Single processing. Single processor soft real-time control.	Reentrance and recursive coding Fixed priority interrupt handling. Task synchronization, complex callbacks, heterogeneoeous dirstributed processing. Single-processor hard real-time control	Multiple resource schefuling with dynamically changing priorities. Microcode-level-control. Distributed hard real-
1.00	2.00	3.00	4.00	5.00	6.00
		X			

Corresponding Points = 3.00

Total Point Score = 15.00

S.2.1.1.3.2 Sub-Table of CPLX



Computational Operation					
Very Low	Low	Nominal	High	Very High	Extra High
Evaluation of simple processing: e.g. A = B+C*(D-E)	Evaluation of moderate-level processing: e.g.D=SQRT(B**2-4.*A*C)	Use of standard math and statistical routines. Basic matrix/vector operations	Basic numerical analysis: multivariate interpolation ordinary differential equations. Basic truncation, roundoff concerns	Difficult but structured near-singular analysis: near-singular matrix equations, partial differential equations. Simple	Difficult but unstructured numerical analysis: highly accurate analysis noisy, stocharastic data, Complex paralellization
1.00	2.00	3.00	4.00	Fifficult bu	6.00
		X			

Corresponding Points = 3.00

S.2.1.1.3.3 Sub-Table of CPLX

Device dependent Operation					
Very Low	Low	Nominal	High	Very High	Extra High
Simple read, write statements with Simple formats	No cognization needed of particular processor or I/O device characteristics. I/O done at GET/PUT level	I/O processing includes device selection, status checking and error processing.	Operations at Physical I/O level(Physical storageaddress translations;seeks, reads, etc.) Optimized I/O overlap.	Routines for interruptdiagnosis, servicing, masking. Commu-nication line handlingPerformance-intensive embeddedsystems.	Device timing-dependent coding,micro-programmedoperations. Performance-criticalembedded systems.
1.00	2.00	3.00	4.00	5.00	6.00
		x			

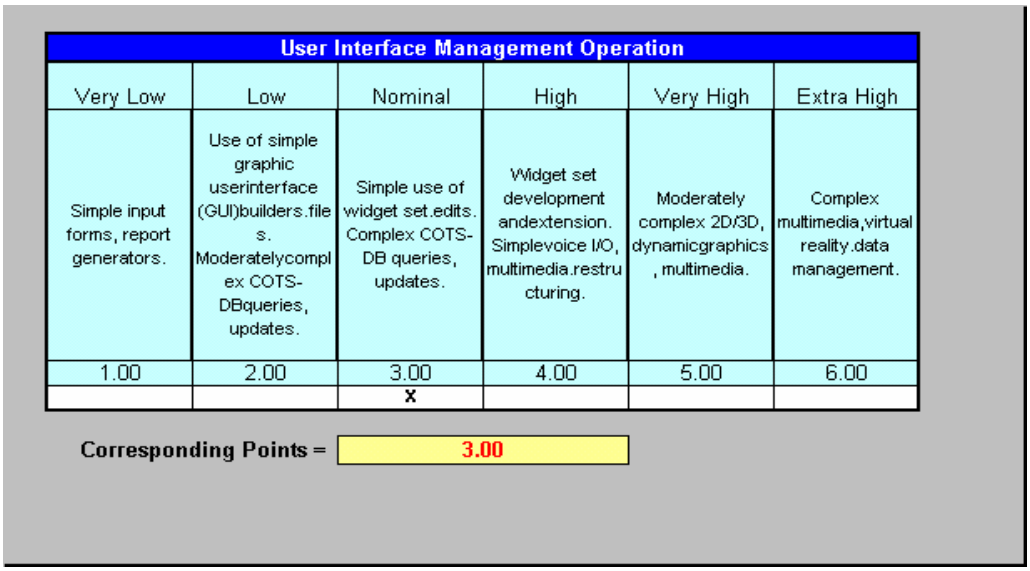
Corresponding Points = 3.00

S.2.1.1.3.4 Sub-Table of CPLX

Device dependent Operation					
Very Low	Low	Nominal	High	Very High	Extra High
Simple read, write statements with Simple formats	No cognization needed of particular processor or I/O device characteristics. I/O done at GET/PUT level	I/O processing includes device selection, status checking and error processing.	Operations at Physical I/O level(Physical storageaddress translations;seeks, reads, etc.) Optimized I/O overlap.	Routines for interruptdiagnosis, servicing, masking. Commu-nication line handlingPerformance-intensive embeddedsystems.	Device timing-dependent coding,micro-programmedoperations. Performance-criticalembedded systems.
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

S.2.1.1.3.5 Sub-Table of CPLX

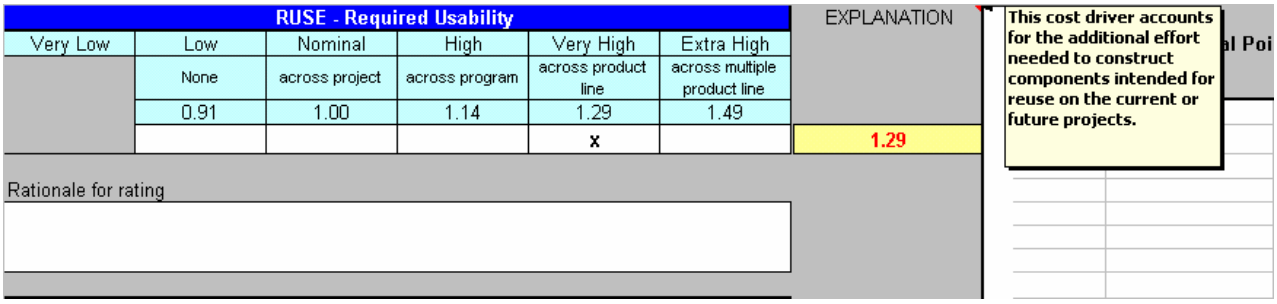


User Interface Management Operation					
Very Low	Low	Nominal	High	Very High	Extra High
Simple input forms, report generators.	Use of simple graphic userinterface (GUI)builders.files. Moderatelycomplex COTS-DBqueries, updates.	Simple use of widget set.edits. Complex COTS-DB queries, updates.	Widget set development andextension. Simplevoice I/O, multimedia.restructuring.	Moderately complex 2D/3D, dynamicgraphics, multimedia.	Complex multimedia,virtual reality.data management.
1.00	2.00	3.00	4.00	5.00	6.00
		x			

Corresponding Points = 3.00

S2.1.1.4 Required Usability--RUSE

Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box

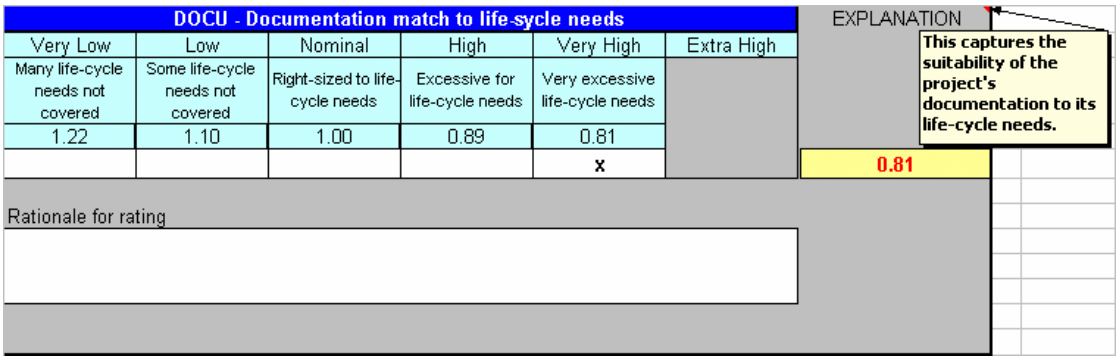


RUSE - Required Usability						EXPLANATION
Very Low	Low	Nominal	High	Very High	Extra High	This cost driver accounts for the additional effort needed to construct components intended for reuse on the current or future projects.
	None	across project	across program	across product line	across multiple product line	
	0.91	1.00	1.14	1.29	1.49	
				x		1.29

Rationale for rating

S2.1.1.5 Documentation Match to life Cycle—DOCU

Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box



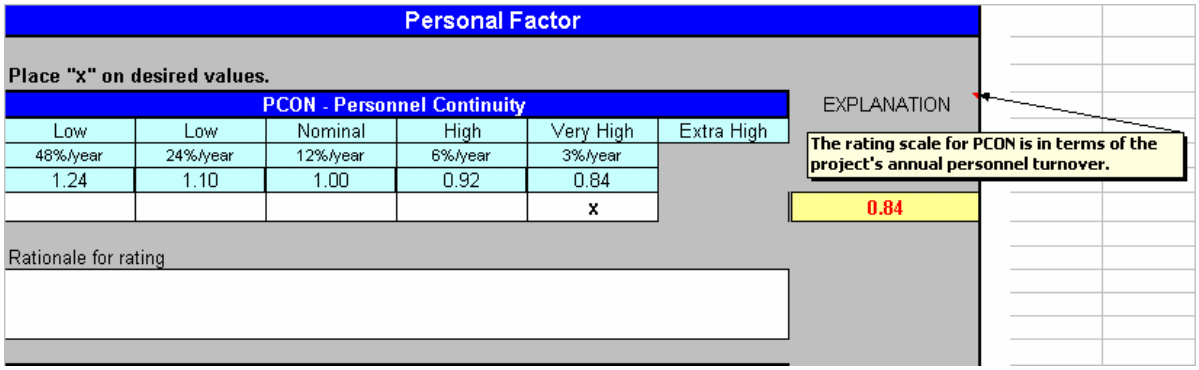
DOCU - Documentation match to life-cycle needs						EXPLANATION
Very Low	Low	Nominal	High	Very High	Extra High	This captures the suitability of the project's documentation to its life-cycle needs.
Many life-cycle needs not covered	Some life-cycle needs not covered	Right-sized to life-cycle needs	Excessive for life-cycle needs	Very excessive life-cycle needs		
1.22	1.10	1.00	0.89	0.81		
				x		0.81

Rationale for rating

Section 2: Personal factor Section

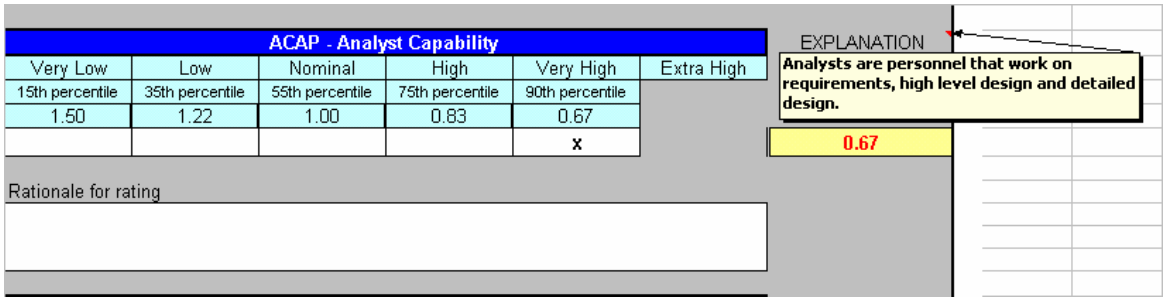
T2.1.2.1. Personal Factor--PCON

Step	Step description	System response/ Notes
1	Enter “X” in selected rank	Show value of selected field in Output Box



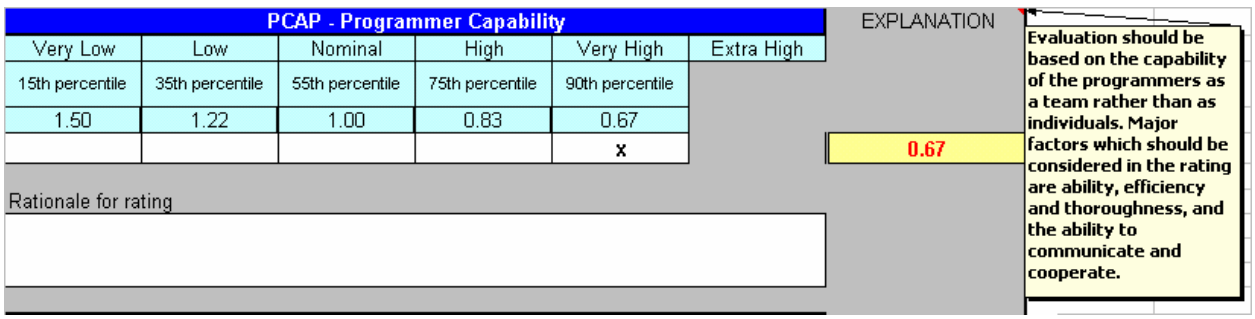
T.1.2.2 Analyst Capability—ACAP

Step	Step description	System response/ Notes
1	Enter “X” in selected rank	Show value of selected field in Output Box



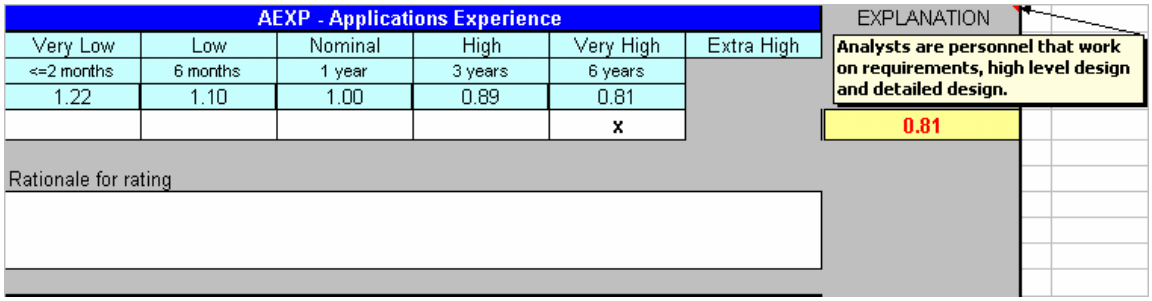
T2.1.2.3 Programmer Capability--PCAP

Step	Step description	System response/ Notes
1	Enter “X” in selected rank	Show value of selected field in Output Box



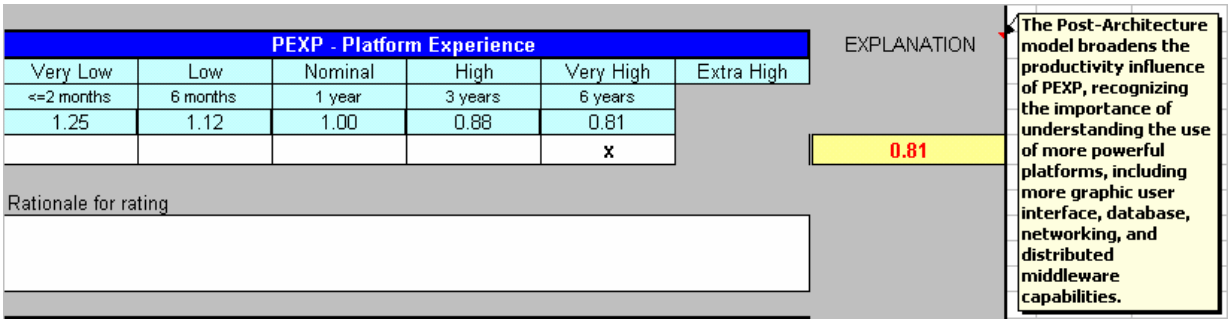
T2.1.2.4 Application Experience--AEXP

Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box



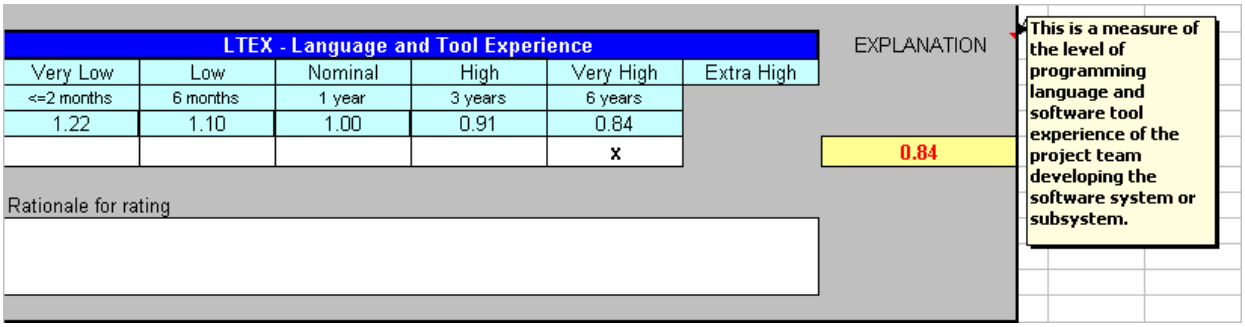
T2.1.2.5 Platform Experience--PEXP

Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box



T2.1.2.6 Language and Tool Experience—LEXP

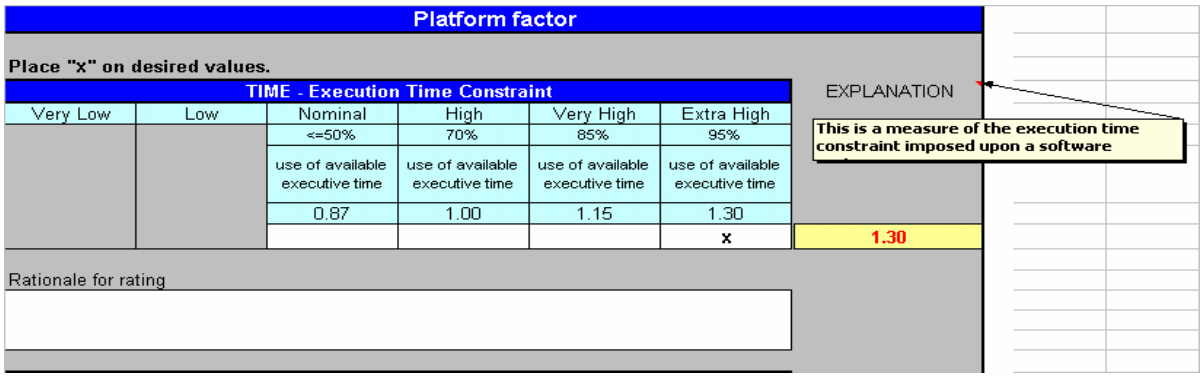
Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box



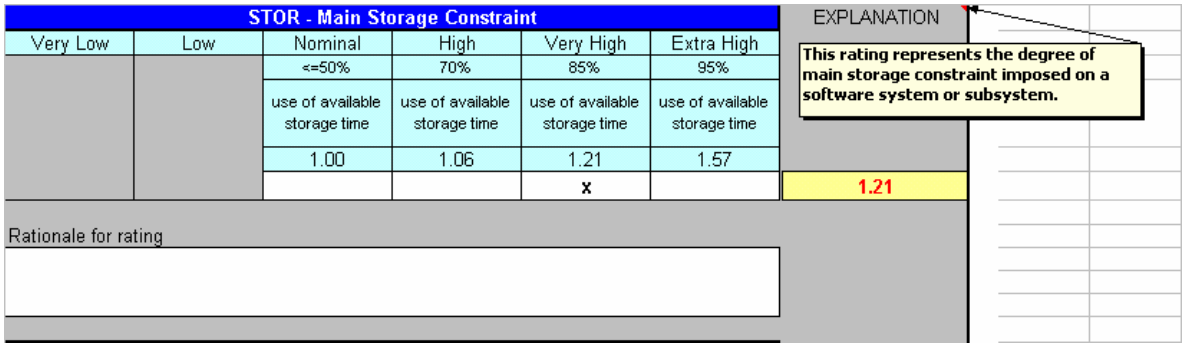
Section 3: Platform factor Section

T2.1.3.1. Execution Time Constraint—TIME

Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box

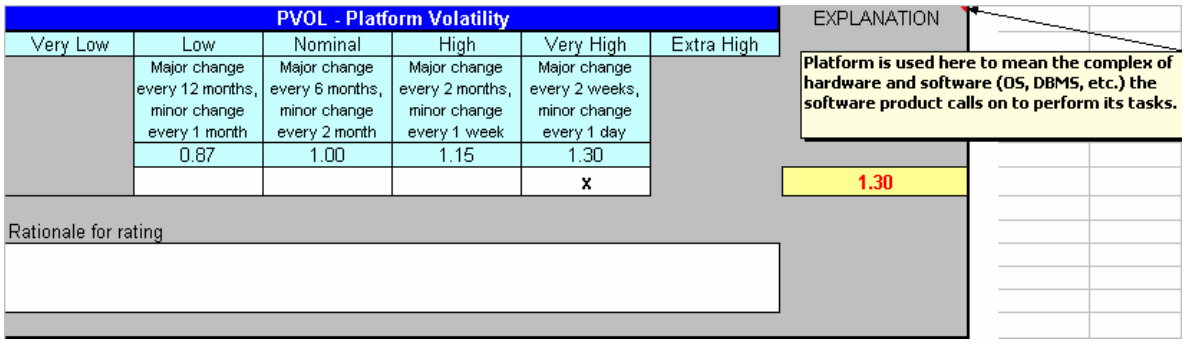


T2.1.3.2. Main Storage Constraint--STOR



T2.1.3.3. Platform Volatility—PVOL

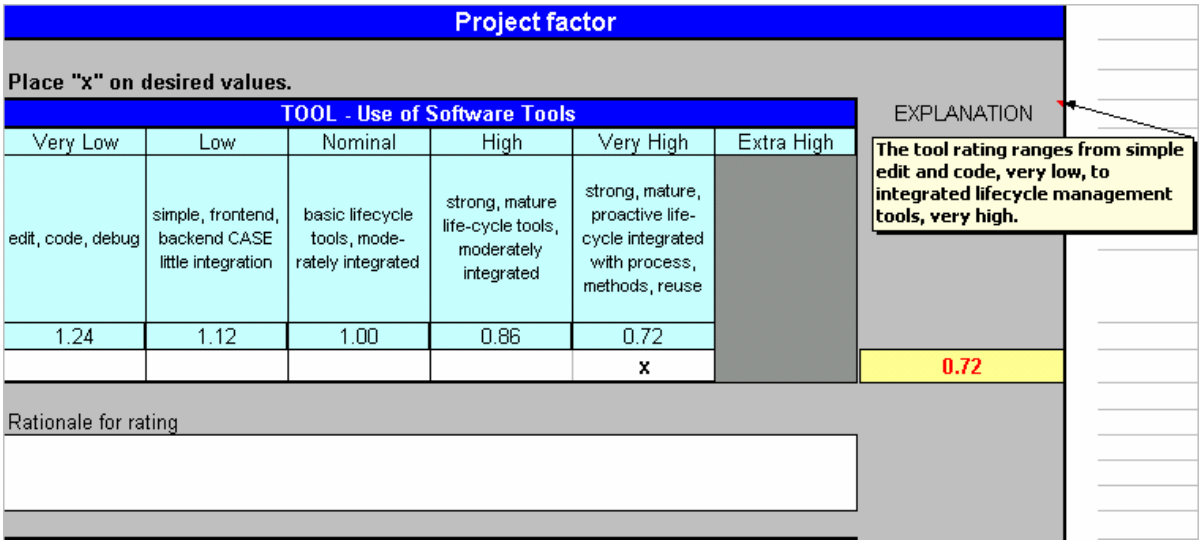
Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box



Section 4: Project factor

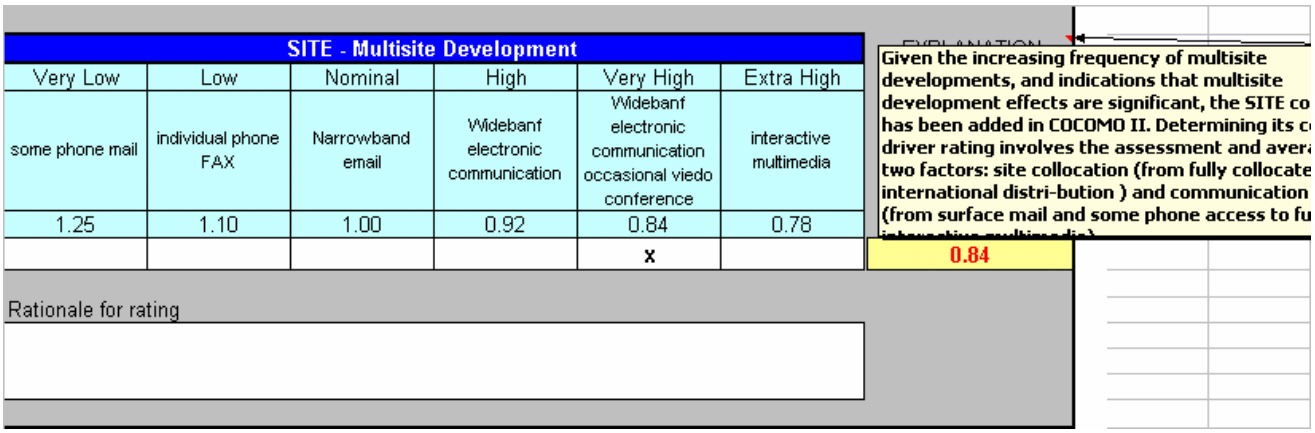
T2.1.4.1. Use of the Software Tool—TOOL

Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box



T2.1.4.2. Multisite Development--SITE

Step	Step description	System response/ Notes
1	Enter "X" in selected rank	Show value of selected field in Output Box



P2.2 COCOMOII Output form

Description
It will show up the accuracy result of COCOMOII after complete input all factors' forms.
Features

Section1: ***Project Header Section***
Section2: ***Scale Factors Section***
- Link to Project Scale factors value to get value for calculation COCOMOII from Overall project.

Section3: ***EM Section***
- Link to Project Scale factors value to get value for calculation COCOMOII from Input form.

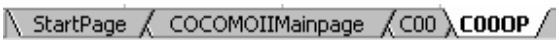
Section 4: ***Calculation section***
- Return all COCOMOII calculation results

- COCOMOII will estimate value for your project after input all factors

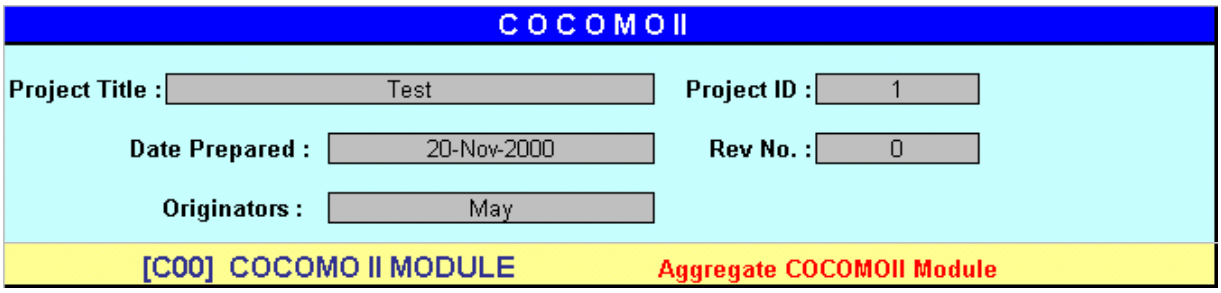
Instructions
You have to input product factor, platform factor, project factor, and personal factor sheets. Then, application will calibrate COCOMOII output in main page.

Step	Step description	System response/ Notes
1	After Input all Factor Sheets	
2	Input Information in Calculation section	Calibrate Output

Application Interface



Section 1 Project Header



Section 2: Scale Factor Section

Scale Factor (SF) Section

PREC	FLEX	RESL	TEAM	PMAT
4.96	3.04	5.65	3.29	1.56

ΣSF (Summation of Scale Factor) = 18.5

Section 3: EM Section

EM Section

Product Factors

RELY	DATA	CPLX	RUSE	DOCU
1	1.28	1	1.15	1.23

Platform Factors

TIME	STOR	PVOL
1.63	1.17	1.3

Personnel Factors

PCON	ACAP	PCAP	APEX	PLEX	LTEX
0.81	0.71	0.76	0.81	0.85	0.84

Project Factors

TOOL	SITE
0.78	0.86

Section 4: Calculation Section

Calculation Section			
INPUT			
	Value overridable in colored field		
DM (% Design Modified)	100	%	
CM (% Code Modified)	100	%	
IM (% of Integration Required for the Adapted Software)	100	%	
AAF = ((0.4 x DM) +(0.3 x CM) +(0.3 x IM)) (Adaptation Adjustment Factor)	**100**	%	
AA (% Assessment and Assimilation)	4	%	
SU (% Software Understanding)	30	%	
UNFM (Programmer Unfamiliarity with Software)	0.4		
AAM = --> **AAF < = 50** ; (AA + AAF x (1 +[0.02 x SU x UNFM]))/100) --> **AAF > 50** ; (AA + AAF + [SU x UNFM])/100 (Adaptation Adjustment Modifier)	**1.160**	%	
Adapted KSLOC	500	**KSLOC**	
AT (% of the Adapted KSLOC that is re-engineered by automatic translation)	100	%	
Equivalent KSLOC = (Adapted KSLOC x (1-(AT/100)) x AAM)	**0.000**	**KSLOC**	
REVL (% rework in the system independent of COTS effects due to requirements evolution)	15	%	15 % (value from COCOTS Model)
New KSLOC	1	**KSLOC**	
SIZE = ((1+ (REVL/100)) x (NEW KSLOC + Equivalent KSLOC))	**1.150**	**KSLOC**	
ATPROD (Automatic Translation Productivity)	2.4	**KSLOC/PM**	
Effort Multiplicative and Exponential Constants			
A	2.94		
B	0.91		
E = (B +0.01x(PREC+FLEX+RESL+TEAM+PMAT))	**1.095**		
Schedule Multiplicative and Exponential Constants			
C	3.67		
D	0.28		
F = (D +0.2 x (E - B))	**0.317**		

P3 COCOTS

Description

After selected display COCOTS, the application will display all COCOTS sheets

Features

Composed with 5 main input sections

- **COCOTS Assessment**
- **COCOTS Tailoring**
- **Glue Code Information**
- **COCOTS Glue Code**
- **System Volatility**

Application Interface

P3.1 COCOTS Assessment Page

Description

This sheet is the main page for COCOTS Assessment sub model.

Features

Section 1: ***Project header***

Section 2: ***COTS Class Assessment selection section***

- Selection for 22 Standard COTS classes and 6 additional classes
- Display/Hide input form

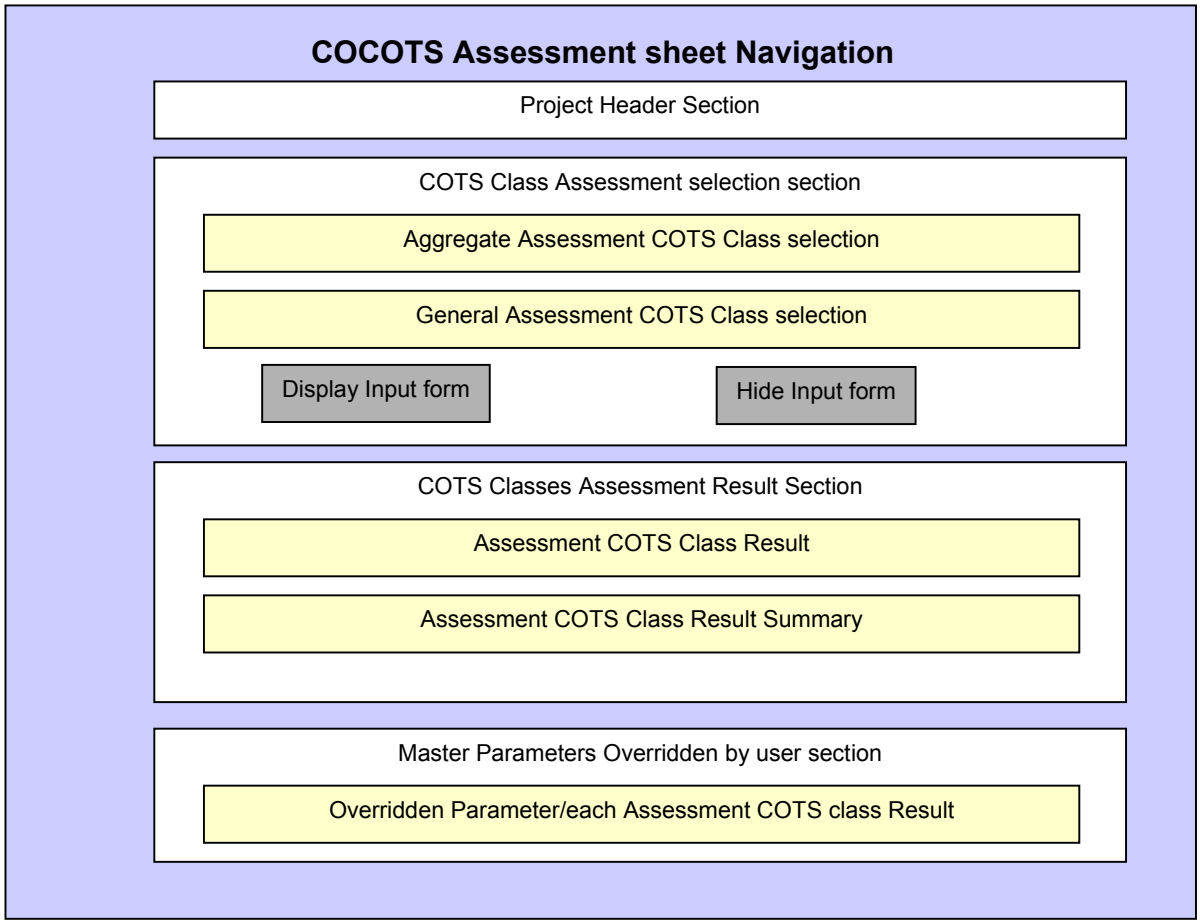
Section 3: ***COTS Classes Assessment Result Section***

- Link all result of COTS of each class

Instruction

You have to select classes of COTS product used in your project, and then after you select display input form, it will pop-up input form for each class. You can also add more classes in the blank field. The application will pop up new class as you input

Page Navigation

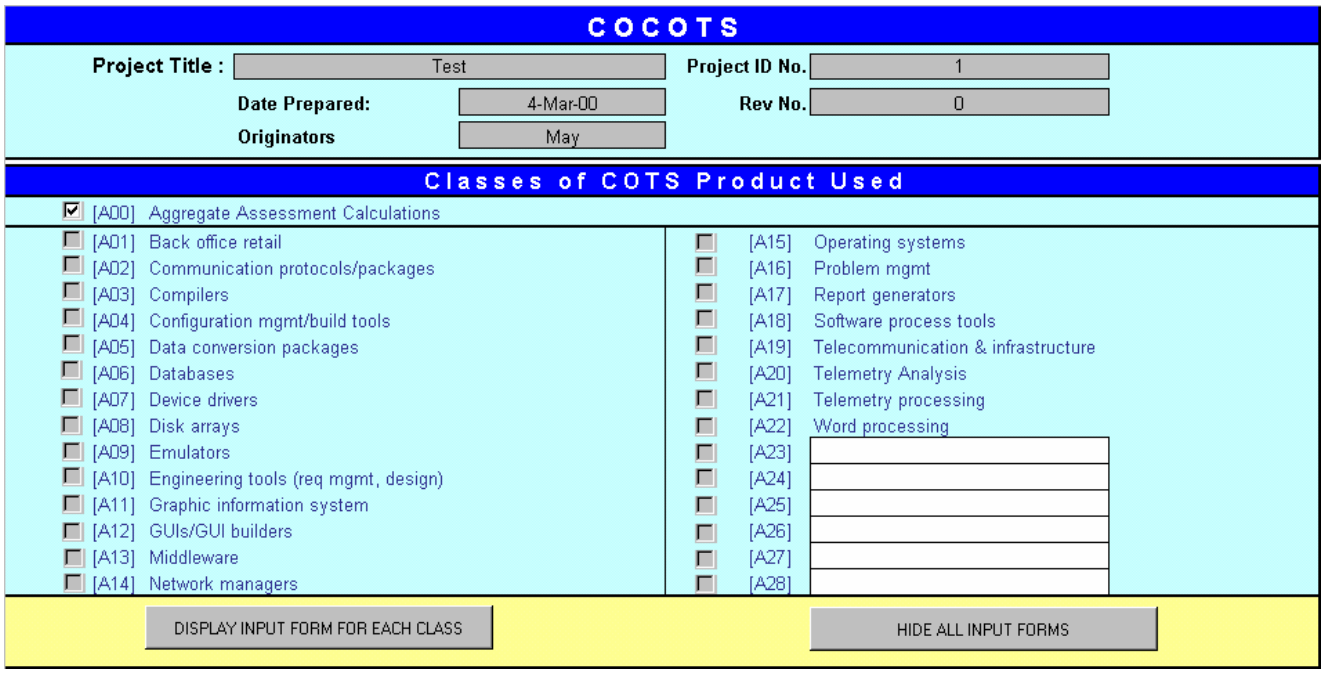


Application Interface

Section1: Project Header

Section2: COTS Class Assessment selection section

Step	Step description	System response/ Notes
1	<Option1> Click [A00] in case required only 1 aggregate COTS class	Disabled all detailed class
2	<Option 2> Click classes that exist in your project	Disabled Aggregate class
3	Select "Display" Button	Display input form/each selected class



Section 3: COTS Classes Assessment Result Section

- Link all result of COTS of each class

Instruction

This section will show up the result of all COTS classes that you already finished input information in input form. The accuracy information will show when you completed all selected classes' input forms.

Result of COCOTS Assessment					
Class	Total Initial Filtering Effort	Total Detailed Assessment Effort	Class	Total Initial Filtering Effort	Total Detailed Assessment Effort
[A00] Aggregate Tailoring Calculations	5.0	0.0			
[A01] Back office retail			[A15] Operating systems		
[A02] Communication protocols/packages			[A16] Problem mgmt		
[A03] Compilers			[A17] Report generators		
[A04] Configuration mgmt/build tools			[A18] Software process tools		
[A05] Data conversion packages			[A19] Telecommunication & infrastructure		
[A06] Databases			[A20] Telemetry Analysis		
[A07] Device drivers			[A21] Telemetry processing		
[A08] Disk arrays			[A22] Word processing		
[A09] Emulators			[A23]		
[A10] Engineering tools (req mgmt, design)			[A24]		
[A11] Graphic information system			[A25]		
[A12] GUIs/GUI builders			[A26]		
[A13] Middleware			[A27]		
[A14] Network managers			[A28]		
			Σ Initial Filtering Effort =	5.0	
			Σ Detailed Assessment Effort =	0.0	
			Total COCOTS Assessment Effort =	5.0	person-months

Section 4: Master Parameters Overridden by user section

- Link all overridden parameters of COTS of each class

Instruction

This section will show up the result of all COTS classes that you already finished input information in input form. The accuracy information will show when you completed all selected classes' input forms.

Master Parameter Defaults Overriden by User					
Class	Initial Filtering Effort	Detailed Assessment Effort	Class	Initial Filtering Effort	Detailed Assessment Effort
[A00] Aggregate Assessment Calculations					
[A01] Generic Component			[A15] Network managers		
[A02] Back office retail			[A16] Operating systems		
[A03] Communication protocols/packages			[A17] Problem mgmt		
[A04] Compilers			[A18] Report generators		
[A05] Configuration mgmt/build tools			[A19] Software process tools		
[A06] Data conversion packages			[A20] Telecommunication & infrastructure		
[A07] Databases			[A21] Telemetry Analysis		
[A08] Device drivers			[A22] Telemetry processing		
[A09] Disk arrays			[A23] Word processing		
[A10] Emulators			[A24]		
[A11] Engineering tools (req mgmt, design)			[A25]		
[A12] Graphic information system			[A26]		
[A13] GUIs/GUI builders			[A27]		
[A14] Middleware			[A28]		

P3.2 COCOTS Tailoring Page

Description

This sheet is the main page for COCOTS Tailoring sub model.

Features

Section 1: ***Project header***

Section 2: ***COTS Class tailoring selection section***

- Selection for 22 Standard COTS classes and 6 additional classes
- Display/Hide input form

Section 3: ***COTS Classes Tailoring Result Section***

- Link all result of COTS of each class

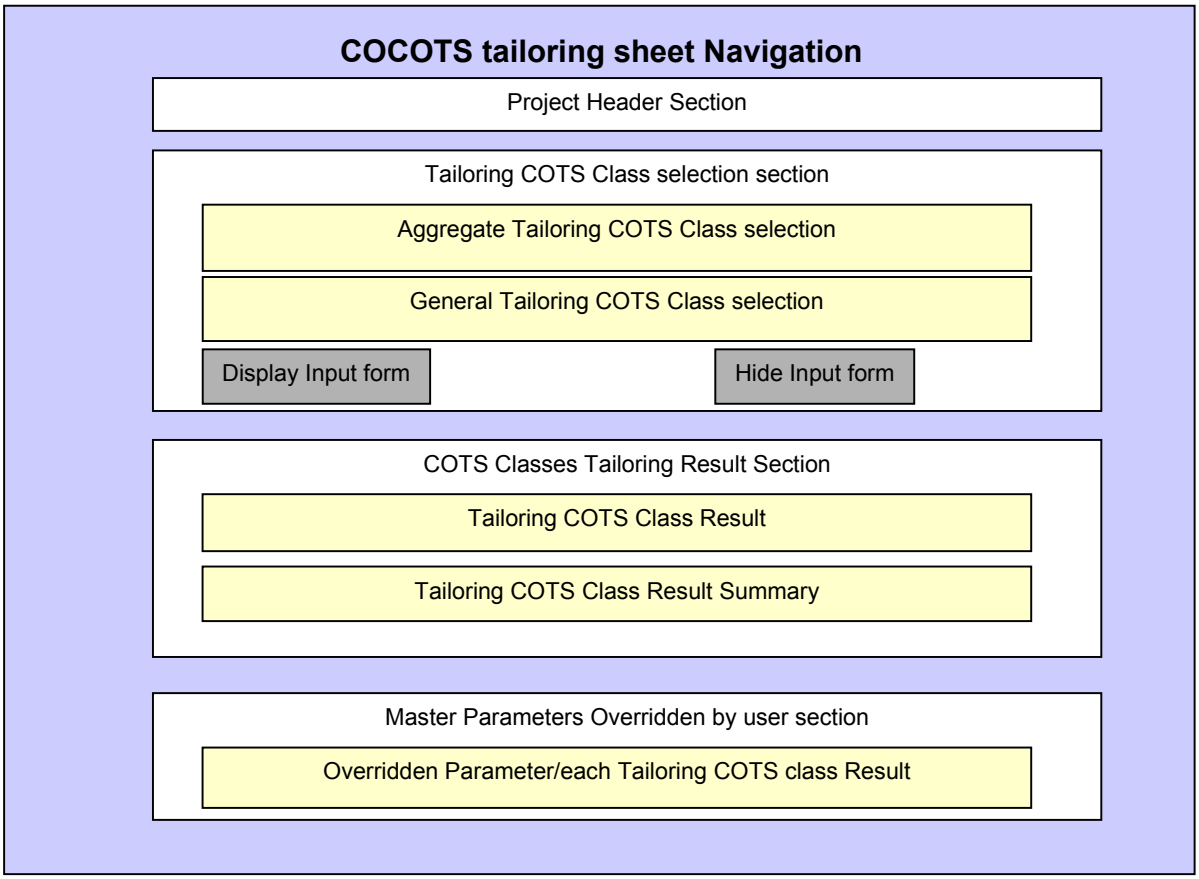
Section 4: ***Master Parameters Overridden by user section***

- Link all overridden parameters of COTS of each class

Instruction

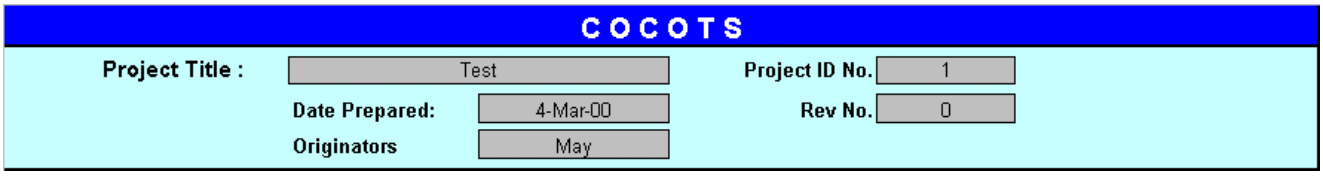
You have to select classes of COTS product used in your project, and then after you select display input form, it will pop-up input form for each class. You can also add more classes in the blank field. The application will pop up new class as you input

Page Navigation



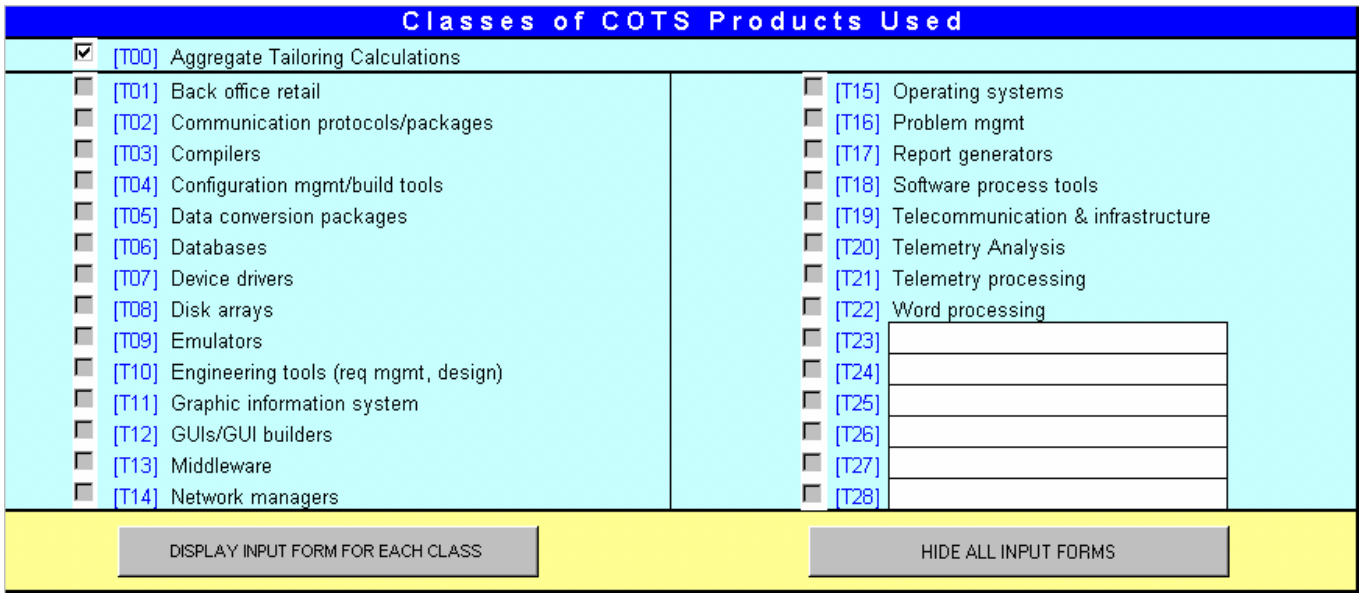
Application Interface

Section1: Project Header



Section 2: COTS Class tailoring selection section

Step	Step description	System response/ Notes
1	<Option1> Click [A00] in case required only 1 aggregate COTS class	Disabled all detailed class
2	<Option 2> Click classes that exist in your project	Disabled Aggregate class
3	Select "Display" Button	Display input form/each selected class



Section 3: COTS Classes Assessment Result Section

- Link all result of COTS of each class

Instruction

This section will show up the result of all COTS classes that you already finished input information in input form. The accuracy information will show when you completed all selected classes' input forms.

Results of COCOTS Tailoring			
Class	**Class Tailoring Effort**	**Class**	**Class Tailoring Effort**
[T00] Aggregate Tailoring Calculations	0.0		
[T01] Back office retail		[T15] Operating systems	
[T02] Communication protocols/packages		[T16] Problem mgmt	
[T03] Compilers		[T17] Report generators	
[T04] Configuration mgmt/build tools		[T18] Software process tools	
[T05] Data conversion pack		[T19] Telecommunication & infrastructure	
[T06] Databases		[T20] Telemetry Analysis	
[T07] Device drivers		[T21] Telemetry processing	
[T08] Disk arrays		[T22] Word processing	
[T09] Emulators		[T23]	
[T10] Engineering tools (req mgmt, design)		[T24]	
[T11] Graphic information system		[T25]	
[T12] GUIs/GUI builders		[T26]	
[T13] Middleware		[T27]	
[T14] Network managers		[T28]	
Project Tailoring Effort (PTE) = Σ [Class Tailoring Effort]			
= 0.0 **person-months**			

Section 4: Master Parameters Overridden by user section

- Link all overridden parameters of COTS of each class

Instruction

This section will show up the result of all COTS classes that you already finished input information in input form. The accuracy information will show when you completed all selected classes' input forms.

Parameter Values Changed by User			
Class	**Avarage Tailoring Effort**	**Class**	**Average Tailoring Effort**
[T00] Aggregate Tailoring Calculations			
[T01] Back office retail		[T15] Operating systems	
[T02] Communication protocols/packages		[T16] Problem mgmt	
[T03] Compilers		[T17] Report generators	
[T04] Configuration mgmt/build tools		[T18] Software process tools	
[T05] Data conversion pack		[T19] Telecommunication & infrastructure	
[T06] Databases		[T20] Telemetry Analysis	
[T07] Device drivers		[T21] Telemetry processing	
[T08] Disk arrays		[T22] Word processing	
[T09] Emulators		[T23]	
[T10] Engineering tools (req mgmt, design)		[T24]	
[T11] Graphic information system		[T25]	
[T12] GUIs/GUI builders		[T26]	
[T13] Middleware		[T27]	
[T14] Network managers		[T28]	

P3.3 Glue Code Information Page

Description

This sheet is the input form page for Glue code information

Features

Section 1: ***Project Header***

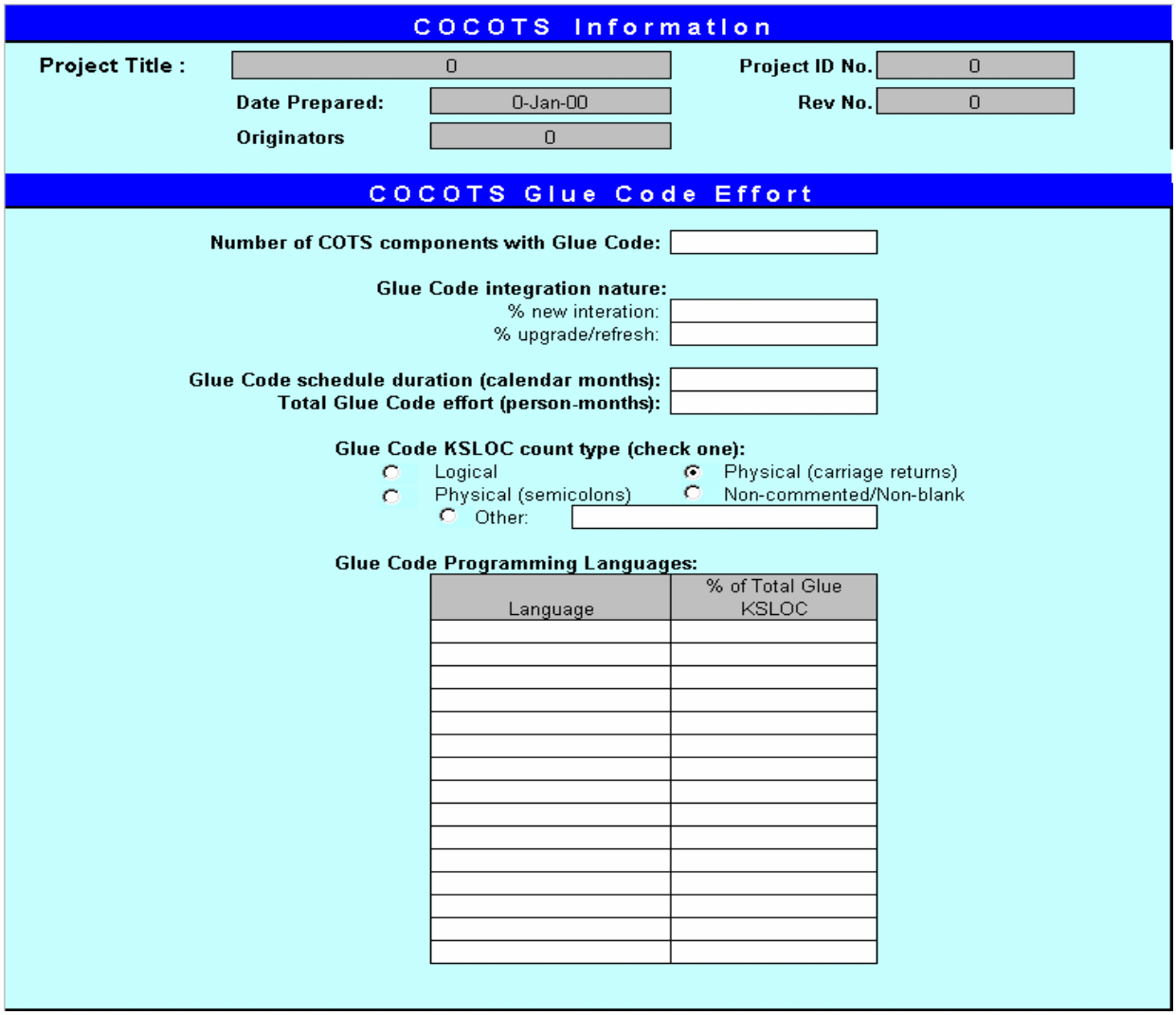
Section 2: ***Glue Code Information***

- Input information

Application Interface

Instruction

Step	Step description	System response/ Notes
1	Input all blank field /made a selection in selection fields	Keep in database



P3.4 COCOTS Glue Code Page

Description

This sheet is the main page for COCOTS Tailoring sub model. It consists of 4 main sections

Features

Section 1: ***Project header***

Section 2: ***COTS Class Glue Code selection section***

- Selection for 22 Standard COTS classes and 6 additional classes
- Display/Hide input form

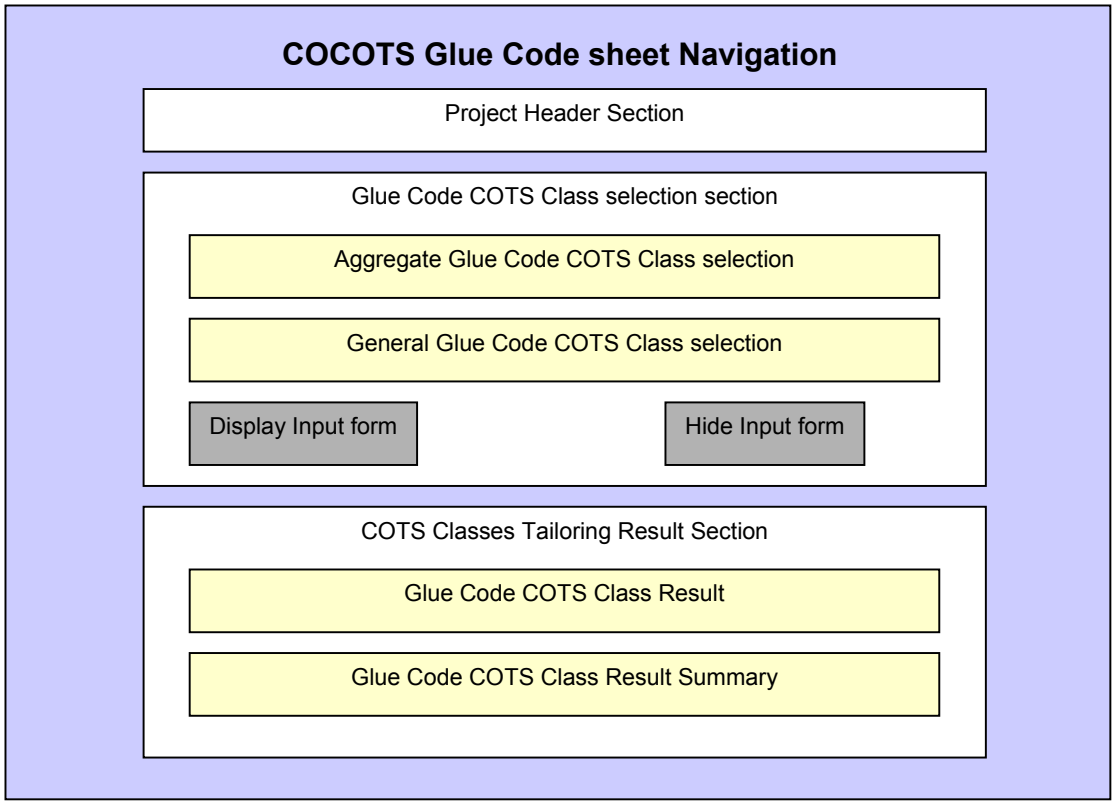
Section 3: ***COTS Classes Glue Code Result Section***

- Link all result of COTS of each class

Instruction

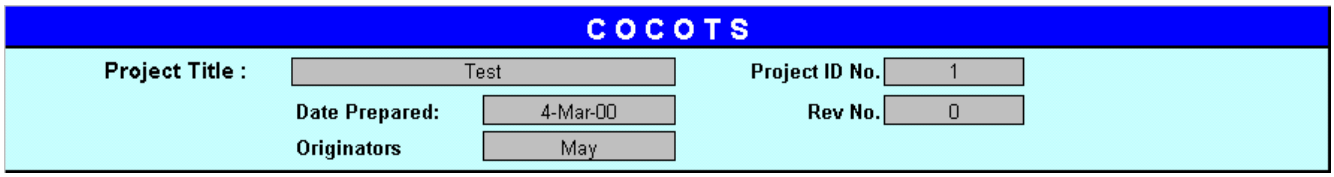
You have to select classes of COTS product used in your project, and then after you select display input form, it will pop-up input form for each class. You can also add more classes in the blank field. The application will pop up new class as you input

Page Navigator



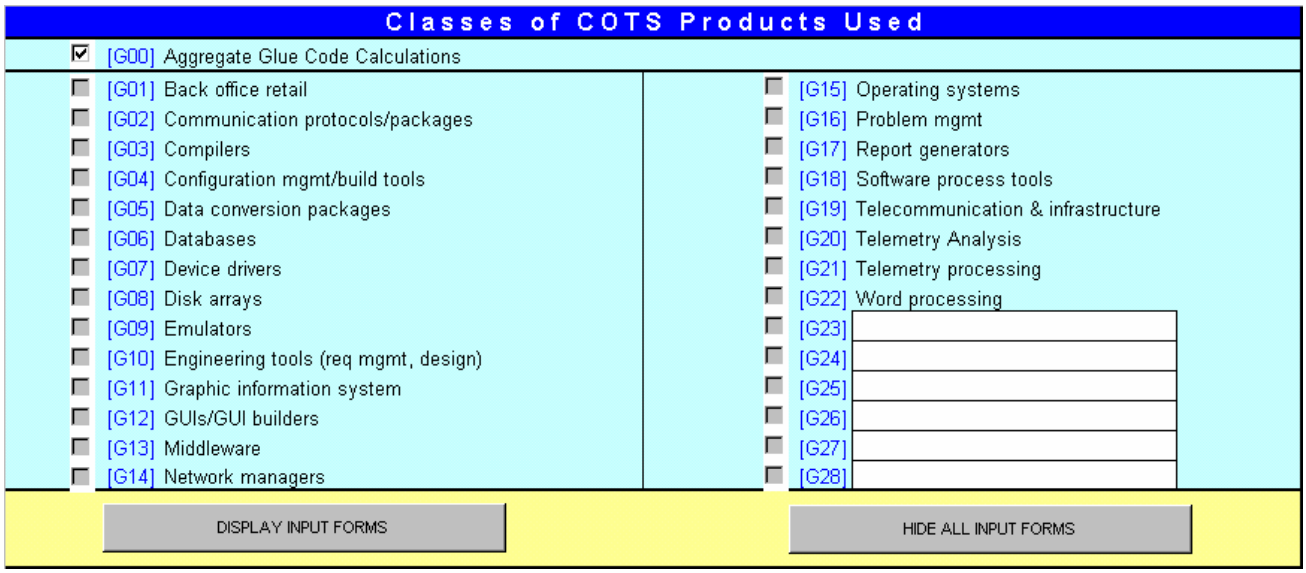
Application Interface

Section 1: Project Header



Section 2: COTS Class Glue Code selection section

Step	Step description	System response/ Notes
1	<Option1> Click [A00] in case required only 1 aggregate COTS class	Disabled all detailed class
2	<Option 2> Click classes that exist in your project	Disabled Aggregate class
3	Select "Display" Button	Display input form/each selected class



Section 3: COTS Classes Glue code Result Section

- Link all result of COTS of each class

Instruction

This section will show up the result of all COTS classes that you already finished input information in input form. The accuracy information will show when you completed all selected classes' input forms.

Results of COCOTS Glue Code			
Class	**Class Glue Code Effort**	**Class**	**Class Glue Code Effort**
[G00] Aggregate Glue Code Calculations	2.0		
[G01] Back office retail		[G15] Operating systems	
[G02] Communication protocols/packages		[G16] Problem mgmt	
[G03] Compilers		[G17] Report generators	
[G04] Configuration mgmt/build tools		[G18] Software process tools	
[G05] Data conversion pack		[G19] Telecommunication & infrastructure	
[G06] Databases		[G20] Telemetry Analysis	
[G07] Device drivers		[G21] Telemetry processing	
[G08] Disk arrays		[G22] Word processing	
[G09] Emulators		[G23]	
[G10] Engineering tools (req mgmt, design)		[G24]	
[G11] Graphic information system		[G25]	
[G12] GUIs/GUI builders		[G26]	
[G13] Middleware		[G27]	
[G14] Network managers		[G28]	

Project Glue Code Effort (PGCE) = Σ [Class Glue Code Effort]

= 2.0 person-months

P3.5 System Volatility

Description

This sheet is the input form page for each COTS class that is selected in COCOTS Assessment page

Features

Section 1: ***Overall Project Factors***

- Link scale factor value from Overall project—COCOMOII project scale factor sheet.

Section 2: ***Estimate from COCOMO II***

- Link REVL (% rework in the system independent of COTS effects due to requirements) from Overall project--COCOMOII project scale factor sheet.
- Link Application Effort (PM) from Overall project--COCOMOII project scale factor sheet.

Section 3: ***Factors from COCOTS***

- Link SCREVOL (% rework in the system due to COTS volatility and COTS requirements change) from Overall project—COCOTS project scale factor sheet.
- Link EAFcots(Effort Adjustment factor; product of effort multipliers)

Section 4: ***Approximate Model Effort***

- Output of calculation Approximate Model Effort

Section 5: ***Detailed Model Effort***

- Output of Detailed Model Effort

Application Interface

Instruction

Step	Step description	System response/ Notes
1	Input all blank field	Calibrate all System Volatility value
2	Review/Override value in Purple field (if necessary)	Recalibrate value in case of changing

COCOTS System Volatility Model

Project Title :	Test	**Project ID No.**	1
Date Prepared:	20-Nov-00	**Rev No.**	0
Originators	May		

Overall Project Factors

Value overridable in colored field

ΣSF: Summation of COCOMO II Project Scale Factors	18.50	18.50 (value from project scale factor)

Estimate from COCOMO II

REVL (% rework in the system independent of COTS effects due to requirements evolution)	15 %	15 % (value from COCOMO Model)
Application Effort (PM)	211.12	211.12 **Person-months** (value from COCOMO Model)

Factors from COCOTS

SCREVOL (% rework in the system due to COTS volatility and COTS requirements change)	0.00 %	
EAF_{COTS} (Effort Adjustment factor; product of effort multipilers)	1.00	(value from Glue Code EAF)

Approximate Model

Volatility Multiplicative Constant V1 (Constant used for calculation of system volatility Effort)	1.00	1.00 (Value from Master Parameter)
Total Effort	0.00	**Person-months**

(V1 x Application Effort x [SCREVOL/100] x EAF_{COTS})

Detailed Model

Volatility Multiplicative Constant V2 (Constant used for calculation of system volatility Effort)	1.00	1.00 (Value from Master Parameter)
Total System Volatility Effort	0.00	**Person-months**

(V2 x Application Effort x $[(1 + SCREVOL/(1+REVL)))^{(B+(0.01 \times))} - 1]$ x EAF_{COTS})

P4 Combined Schedule and Effort Sheet

Description

This sheet is the input form page for each COTS class that is selected in COCOTS Assessment page

Features

Section 1: ***Project header***

- Link all information from COCOTS main page

Section 2: ***Summary of COCOTS efforts for 4 main sub models***

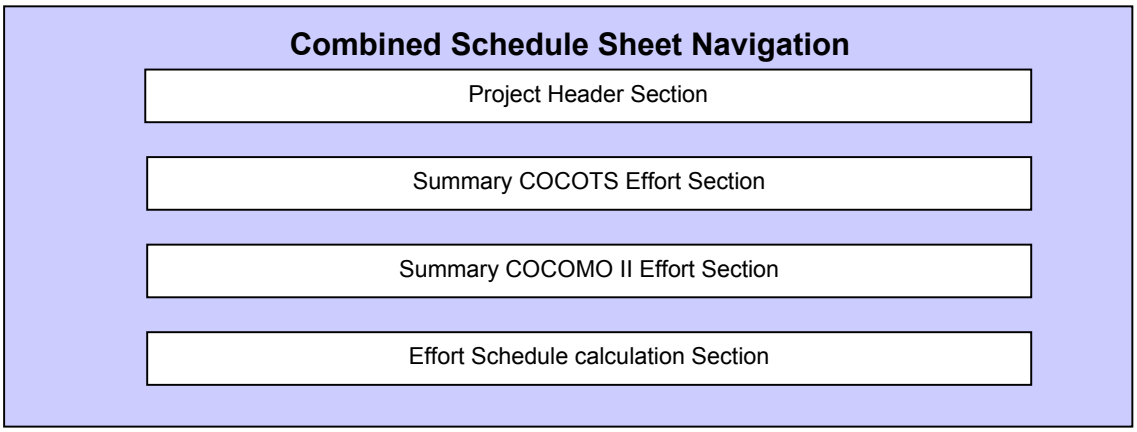
- COCOTS efforts with Override-able field (Purple)

Section 3: ***COCOMO II Effort***

- Link to COCOMO Sheet value with Override-able field (Purple)

Section 4: ***Effort and Schedule Equations***

- Output of Time in calendar month



Application Interface

PROJECT SCHEDULE

Project Title :	Test	**Project ID No.**	1
Date Prepared:	20-Nov-00	**Rev No.**	0
Originators	May		

Summary COCOTS Effort

Value overridable in colored field

Total Assessment Effort	0.00	Person-months
Total Tailoring Effort	0.00	Person-months
Total Glue Code Effort	0.00	Person-months
Total System Volatility Effort	0.00	Person-months
Total COCOTS Effort	0.00	Person-months

COCOMO II Effort

ΣSF: Summation of COCOMO II Scale Factors	18.50	
Total COCOMO II Effort	211.12	Person-months

Schedule and Effort Equations

B: The Scale base-component for the effort equation	0.91	
C: Coefficient that can be calibrated	3.67	
D: Scaling base-exponent that can be calibrated	0.28	
E : The scaling exponent for the effort equation (E = B+0.01ΣSF)	1.10	
F: Scaling exponent for schedule (F = D + 0.2x[E - B])	0.32	
$CombinedPM_{NS}$: Person Months estimated without the SCED cost driver (Nominal Sc	211.12	Person-months
(COCOTMO II Effort + 75% of Total Assessment Effort + 100% of Total Tailoring Effort + 100% of Total Glue Code Effort + 100% of ToTal System Volatility Effort)		
SCED : Percentage of Required Schedule Compression	93%	
TDEV : Time to Develop in Calendar months $(C \times (CombinedPM_{NS})^{F}) \times \frac{SCED\%}{100}$	18.52	Months

P5. Master Parameters

Description

Master parameters used for all spreadsheet. Advance user can adjust all value but it will result in calibration data

Master Parameters composed of

- COCOTS Master Parameters
- COCOMOII Master Parameters

Reference

1. Software Cost Estimation with COCOMOII, *Barry Boehm, Chirs Abts, A Winsor Brown, Sunita Chulani, Bradford K. Clark, Ellis Horowiz, Ray Madachy, Donald Reifer, Bert Steerc*, 2000
2. Center of Software Engineering Website, Univerity of Southern California, http://sunset.usc.edu